Independent Oversight Evaluation of

EMERGENCY MANAGEMENT PROGRAMS ACROSS THE DOE COMPLEX

Volume 1

1

DOE-Wide Perspective

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OVERSIGHT

Executive Summary

This independent oversight evaluation of U.S. Department of Energy (DOE) emergency management was chartered as a part of a number of directives from the Secretary of Energy following the May 1997 chemical explosion at the Hanford Site. These directives also included developing or upgrading emergency hazards assessments and emergency action levels, improving training for emergency response personnel, ensuring effective medical treatment for affected workers, and evaluating radiological and chemical vulnerabilities. Under these initiatives, the DOE Headquarters Office of Emergency Management (NN-60) has performed an evaluation of emergency action levels and provided training on conservative emergency classification extending throughout the DOE complex.

The Secretarial initiatives have contributed to increased management attention and some specific and ongoing improvements in emergency management programs. However, the overall conclusion of the independent oversight evaluation is that DOE emergency management programs, as a whole, are still in need of substantial improvement and management attention. Some sites did not make sufficient improvements in response to the Secretary's initiatives because they did not realistically assess their own performance and use the feedback and lessons learned from other DOE sites to benchmark performance. The weaknesses across the complex identified during this evaluation were similar to those evident over a year ago in the response to the Hanford explosion, indicating that the problems in emergency response could still be repeated today at many DOE sites.

Generic weaknesses, applicable to multiple DOE sites, are evident in several emergency management elements, including classification of events, hazards and consequence assessments, protective actions and medical response, and interfaces and coordination with external organizations and the public. During 1998 emergency exercises, for example, weaknesses were evident in many areas, including delays and errors in classification, emergency responders traversing radiological or chemical plumes, inadequate consequence assessments and protective actions, significant delays in medical treatment of victims, and a failure to provide dose or exposure information to participating hospitals.

Except for the recent Secretarial initiatives, DOE Headquarters commitment, support, and participation in monitoring and improving emergency management have been very limited. In accordance with the ongoing DOE initiatives to empower the field, various responsibilities and authorities have transitioned from Headquarters to the field, including some of the responsibilities for emergency management programs. The restructuring of responsibilities, combined with continuing Headquarters reorganizations and turnover of leadership, has exacerbated a longstanding lack of clarity and understanding of Headquarters roles, responsibilities, and authorities for emergency management. Previous concerns with multiple emergency plans across the separate program offices remain unresolved, and the two committees formed to address generic emergency management issues have not been effective. In some instances, program offices have not been active in monitoring emergency preparedness and performance at sites and facilities for which they have responsibility. Additionally, the Headquarters Executive Team and program offices have not routinely participated in training and exercises to ensure proficiency in supporting the field and interfacing with other agencies.

A number of DOE operations offices have not been adequately engaged in monitoring and assessing contractor emergency response programs and assuring accountability for performance. Notable exceptions include the Rocky Flats Field Office, Savannah River Operations Office, and Richland Operations Office, which are actively involved in oversight of contractor emergency management programs. DOE operations offices need to be more involved in reviewing and approving contractor submittals, evaluating emergency programs and competencies, and evaluating drills and exercises. Some operations offices need to ensure that managers and staff have the requisite training, experience, and proficiency to perform emergency management and response duties.

DOE contractors vary considerably in the effectiveness of their emergency management programs and level of preparedness. The Savannah River Site has established a strong and mature emergency management program that includes several noteworthy practices, including their state-of-the-art emergency response facilities, a comprehensive drill and exercise program, and critical self-assessments of emergency management. Three sites—Idaho National Engineering and Environmental Laboratory, Los Alamos National Laboratory, and most recently Hanford—have accomplished significant and considerable program upgrades over a short time. Hanford has employed a systematic project approach to substantially improve emergency management response over the last year. Other examples of upgrades at these sites include completion of comprehensive hazards assessments and emergency action levels, strengthening of incident command and initial response capabilities, improvement of training and competencies, improvement of protective actions and medical treatment for workers, and strengthening of interface and coordination with stakeholders and mutual aid organizations.

At the other end of the spectrum, several DOE sites continue to have significant weaknesses in their emergency management programs and response capabilities. The Nevada Test Site, for instance, is just beginning to establish a structured, sitewide program. Other sites still have not developed comprehensive and current hazards assessments, conservative and usable emergency action levels, approved and current emergency procedures, effective training and drill programs, challenging exercise programs, critical self-assessments, and effective interfaces with stakeholders. This continuing wide variation in the quality of emergency management programs highlights a need for a more corporate approach to emergency management, including sharing of lessons learned, benchmarking, and a central point of line management leadership.

Improvements are needed at all levels of the organization. DOE Headquarters needs to establish an effective mechanism to resolve organizational conflicts; clarify roles and responsibilities to eliminate unnecessary redundancy and conflicts between Headquarters programs and facilitate operations of the DOE Headquarters Emergency Operations Center; ensure that appropriate resources are provided consistent with the identified needs; and effectively monitor emergency program performance and improvements complex-wide. The operations offices need to establish meaningful performance measures to drive improvement, be more effectively engaged in monitoring the full scope of contractor programs, ensure the emergency response and programmatic competencies of their own staffs, maintain agreements with stakeholders, and manage the release of public emergency information. Contractors need to correct problems that were evident in the response to the May 1997 Hanford explosion and that are still evident in recent exercises. These include: lack of quality, consistency, and adequacy of programs and procedures; ineffective communication of hazards; weaknesses in the worker protection programs; and delays in providing medical treatment to workers and responders. To correct these deficiencies, DOE's contractors need to place higher priority on improving the quality of the technical basis for hazards assessments; ensuring the quality and comprehensiveness of interrelated emergency programs and procedures; providing performance-based training to improve proficiencies; and providing for timely and accurate public information.

Most significantly, DOE and its contractors need to improve their capability to realistically evaluate emergency preparedness through self-assessments, line management oversight of the full scope of programmatic activities, and benchmarking. Inherent in such self-evaluations is a willingness to recognize when exercises demonstrate that performance is not adequate, to take corrective actions, and then to repeat exercises or exercise elements until there is adequate assurance that exercise objectives can be successfully met. Realistic feedback and successful emergency exercises are essential to ensuring that DOE has an accurate picture of the actual status of its emergency management programs and does not develop a false sense of security. Such feedback is also essential to ensuring a sustained and acceptable capability to recognize and mitigate emergencies and to protect workers, the public, and the environment.

WEAKNESSES IN DOE EMERGENCY MANAGEMENT PROGRAMS

Longstanding Headquarters Weaknesses (See Tables 2 and 3 and Section 4 for Details and Section 5 for Opportunities for Improvement Related to Headquarters Weaknesses)

- DOE Headquarters roles, responsibilities, authority, and accountability are unclear and not understood.
- The lack of a central point of line management leadership has contributed to inconsistent performance and effectiveness and fragmented efforts to improve.
- The Headquarters Executive Team and program offices are not maintaining emergency management competency and proficiency through participation in training, drills, and exercises.
- Headquarters program offices, the office responsible for policy and technical assistance (NN-60), and the Office of Environment, Safety and Health have not been actively monitoring emergency management program capabilities and performance.
- Efforts to ensure that the DOE emergency management order is effectively implemented and enhanced have not been sufficient to address problems in the order (e.g., transportation events, timely classification, accounting for personnel after an accident).

Generic Weaknesses Evident at Multiple Sites (See Section 4 for Details on Weaknesses in Operations Offices and Contractors and Appendix A for a Discussion of Each of the Weaknesses Below, Including Opportunities for Improvement and Examples of Good Performance to Benchmark Improvements)

- Hazards assessments and protective actions at several sites were not developed, not reflective of current hazards, or lacked an adequate technical basis.
- Event classification and emergency action levels may not be timely and conservative because DOE sites have not established effective emergency action levels, procedures, training, drills, exercises, and competencies.
- Performance and feedback mechanisms, such as DOE oversight and contractor self-assessments, have not been effective in ensuring adherence to requirements and expectations, identification and resolution of significant weaknesses, and achievement of continuous improvement.
- Worker safety and health have not received sufficient emphasis in hazards and risk assessments, work planning and control, consequence assessment, search and rescue, personnel accountability, protective actions, and medical treatment.
- Training, competencies, and proficiency of personnel with emergency management responsibilities and decision-making authority are inconsistent and have not been demonstrated in drills and exercises.
- Stakeholder and public interfaces, coordination, and information have not addressed some stakeholder concerns, including a perception that DOE's notification of events and accidents was not timely in some instances, and have not ensured that agreements with external support organizations are current and that information provided to the public and the media during emergencies is consistently timely and accurate.
- DOE Order 151.1, Comprehensive Emergency Management System, provisions are unclear or require modification in some instances, and DOE and contractor leadership, management followup, and accountability have not been sufficient to ensure that the order is effectively implemented.

1.0 Introduction

Events such as the 1997 explosion at Hanford have raised questions about the effectiveness of the U.S. Department of Energy (DOE) emergency management programs. Recognizing that other sites could have similar problems, this accident prompted the Secretary of Energy to direct all DOE sites to examine their emergency management programs and make needed improvements. The Secretary also directed the DOE Office of Oversight, within the DOE Office of Environment, Safety and Health (EH) to evaluate emergency management programs at DOE sites. In response to the Secretary's direction, the Office of Oversight performed an evaluation of the DOE complex from February to June 1998.

Purpose and Scope of the DOE Emergency Management Programs

Collectively, DOE sites have hundreds of tons of hazardous materials, including radioactive materials, such as plutonium, and a variety of toxic chemicals. DOE has extensive policies and programs that are designed to ensure that such materials are handled safely and to prevent accidents from occurring. DOE sites also have safety equipment and procedures that are designed to mitigate the consequences of an accident or unplanned event. For example, plutonium facilities typically have safety systems, such as high-efficiency particulate air (HEPA) filters, that are designed to prevent the release of plutonium to the atmosphere in the event of an accident.

DOE sites must be prepared for accidents and unplanned releases of hazardous materials.

Despite these safety precautions, unplanned events can and do occur, and the possibility of an accident that releases hazardous materials, no matter how unlikely, cannot be precluded. Further, DOE sites must be prepared to handle emergencies that do not necessarily involve hazardous materials but that could threaten life and property (e.g., fires, earthquakes, tornadoes, and terrorist bombings like the one at the Federal Building in Oklahoma City). Therefore, DOE sites are required to have emergency management systems. These systems are intended to ensure that DOE sites can effectively:

- **Transition from normal operations to emergency operations.** Because accidents can occur at any time and can progress rapidly, sites must be continuously prepared to deal with emergencies and be able to respond promptly. To do so, sites must have an organization and workforce that is well prepared to deal with emergencies, and must have communications systems, response equipment, and facilities in place and available at all times. The transition from normal organizational roles and responsibilities, which are in place 365 days per year, to a new alignment for emergency operations, which may be implemented one day per year in an annual exercise, is not easily accomplished.

- **Respond to emergencies.** When an accident or event occurs, the site must have appropriate personnel and equipment to respond promptly and be able to effectively direct those resources to deal with a wide range of potential emergencies. An effective response requires the coordinated effort of many different organizations both onsite (e.g.,

onsite fire departments, radiation protection, operations, security, engineering) and offsite (e.g., local hospitals, ambulances, local fire departments, local police).

- **Mitigate the severity of accidents.** Some accidents result in the dispersal of hazardous (radioactive, chemical, or biological) materials, and other events (e.g., fires or hurricanes) could threaten the integrity of barriers that contain hazardous materials. In such cases, sites must be able to safely perform a variety of actions to stop the release, prevent further dispersal of hazardous materials, or move people to an area of relative safety. Such actions include decontaminating personnel and equipment, establishing contamination zones to prevent spread of contamination, restoring electric power to safety systems, establishing security boundaries, evacuating buildings, and establishing measures to prevent unauthorized access to accident scenes. Trained personnel with specialized equipment (e.g., protective clothing and/or supplied breathing air systems) are needed to perform such actions safely and promptly.

- **Communicate vital information to stakeholders.** If hazardous material is released, the site must make timely and accurate classification and notification to notify local authorities and the public about the emergency conditions and any recommended protective actions (e.g., evacuating the area, avoiding potentially contaminated areas, or taking shelter indoors with the windows closed). Effective communications are also needed for a variety of other functions, such as coordinating external support (fire, medical, hospitals, police, etc.), keeping local authorities informed, keeping senior DOE managers informed, issuing press releases to keep the media and the public informed, and providing information to families of accident victims.

Managing emergencies requires effective planning and preparation, including a thorough understanding of the potential hazards at the site. For example, to effectively respond to a fire in a building that contains hazardous materials, a site needs to know immediately what types of hazardous events could occur (e.g., release of toxic materials, potential for explosive mixtures, spread of contamination) and other factors related to fire-fighting (e.g., location of water supplies and alternative water supplies, location of backup electric power, doors that can only be opened by security personnel). Such preparation and planning must be done in advance, and data must be maintained in a form that is understandable, readily accessible, and up to date; searching for information about hazardous materials after a fire starts can unacceptably delay actions to mitigate the situation.

Effective planning and preparation, including a thorough understanding of the potential hazards at a site, is essential for a timely response to an accident.

It is also critical that emergency management systems enable a rapid response and, if necessary, timely directions for taking protective measures. For example, the plume of hazardous materials resulting from a serious accident could reach populated areas in a matter of ten minutes (and even less at a few sites). In such cases, the site emergency management personnel have only a short time to coordinate with local authorities to issue warnings and/or instructions (e.g., "take shelter indoors"). With such short timelines, sites must have personnel on site at all times who are trained to and capable of assessing conditions and taking appropriate actions. Coordination with local authorities, formal procedures, readily available information, and practice (e.g., drills and exercises) are also essential.

Decontamination activities

Purpose and Scope of the Oversight Evaluation

The Office of Oversight evaluated the emergency management programs at nine DOE sites and the nuclear material transportation operations performed by the DOE Albuquerque Operations Office Transportation Safeguards Division. Oversight also assessed DOE Headquarters efforts, including both the Headquarters line management functions, which are performed by the program offices, and program management and support activities, which are performed primarily by the Office of Emergency Management (NN-60). The review of Headquarters included interviews with programs office and NN-60 managers and staff, observation of the Headquarters Emergency Operations Center during site annual exercises, and reviews of policies, directives, plans, and training documents. The evaluation was performed to:

- Evaluate the effectiveness of emergency management programs at selected sites/ operations
- Determine whether the actions and enhancements directed by the Secretary have been effectively implemented
- Draw conclusions about the effectiveness of DOE emergency programs as a whole, including the Headquarters role, policy, and interfaces with stakeholders
- Identify complex-wide issues and obstacles to timely enhancement of emergency management
- Determine what additional improvement are needed to ensure that DOE sites have effective programs for managing emergencies.

The Secretary indicated that all corrective actions were to be complete by March 1998. Consistent with this direction, the Oversight evaluation was initiated in February 1998. The Oversight evaluation was not limited exclusively to the actions and enhancements directed by the Secretary of Energy, although these were a major focus. Rather, Oversight examined a broad range of emergency management elements to determine the overall effectiveness of emergency management systems in the field and DOE Headquarters emergency management policies, guidance, and direction.

The sites selected, which encompass a range of DOE program offices, operations offices, and types of facilities and operations, are shown on Table 1. The Oversight team observed a full-participation exercise at four of these sites.

Consistent with the Secretary's direction, the Office of Oversight has included emergency management in recent Office of Oversight safety management evaluations, which evaluate environment, safety and health (ES&H) program management and performance at DOE sites with respect to DOE's integrated safety management policy. The emergency management program at one of the sites included in this evaluation, Lawrence Livermore National Laboratory, was initially reviewed as part of a safety management evaluation in September-November 1997. A followup review of the significant weaknesses identified there was performed as part of this evaluation.

The Office of Oversight met with representatives from nine states.

In addition to program reviews, Oversight interviewed stakeholders to identify their concerns and gather their perspectives on the effectiveness of DOE programs and efforts to build the necessary partnerships. The Deputy Assistant Secretary for Oversight held meetings with the emergency management directors of nine different states (California, Colorado, Georgia, Idaho, Nevada, New Mexico, Tennessee, South Carolina, and Washington). The purpose of these meetings was to discuss the emergency management evaluation and to gather the state agencies' perspectives on DOE emergency management programs and the effectiveness of DOE's interactions with state agencies. These visits provided an opportunity for open and candid feedback on site-specific interfaces, strengths, and concerns. Subsequent to these visits, a questionnaire was disseminated to gather perspectives in specific areas of common concern, such as DOE openness and joint information centers. In addition, during field level programmatic reviews, personnel at state and local agencies and mutual-aid hospitals were interviewed, and current memoranda of understanding, processes for maintaining

Table 1. Sites and Facilities/Activities Reviewed

Sites/Activity Date of Review	Program Office Operations Office/Field Office	Contractors with Overall Responsibility for Site Emergency Management Programs
Nevada Test Site (NTS) February 1998	Defense Programs (DP) Nevada Operations Office (NV)	Bechtel Nevada
Savannah River Site (SRS) March 1998	Environmental Management (EM) Savannah River Operations Office (SR)	Westinghouse Savannah River Company (WSRC)
Los Alamos National Laboratory (LANL) April 1998	Defense Programs (DP) Albuquerque Operations Office (AL) Los Alamos Area Office (LAAO)	University of California
Sandia National Laboratories/ New Mexico April 1998	Defense Programs (DP) Albuquerque Operations Office (AL) Kirtland Area Office (KAO)	Sandia Corporation, a wholly owned subsidiary of the Lockheed-Martin Corporation
Idaho National Engineering Laboratory (INEEL) May 1998	Environmental Management (EM) Nuclear Energy, Science and Technology (NE) Idaho Operations Office (ID)	Lockheed Martin Idaho Technologies Company (LMITCO)
Lawrence Livermore National Laboratory (LLNL) November 1997 Safety Management Evaluation: Followup review as part of this evalaution in May 1998	Defense Programs (DP) Oakland Operations Office (OAK)	University of California
Oak Ridge National Laboratory (ORNL) May 1998	Energy Research (ER) Oak Ridge Operations Office (OR)	Lockheed-Martin Energy Research Systems
Transportation Safeguards Division (TSD) May 1998	Defense Programs (DP) Albuquerque Operations Office (AL)	Not Applicable (TSD uses Federal employees)
Rocky Flats Environmental Technology Site (RFETS) May 1998	Environmental Management (EM) Rocky Flats Field Office (RFFO)	Kaiser-Hill
Hanford Site June 1998	Environmental Management (EM) Richland Operations Office (RL)	Fluor Daniel
NOTE: Throughout this report, organizations will be referred to by the designators in this table.		

agreements, and the effectiveness of site performance in implementing these agreements were reviewed. Particular emphasis was placed on the interfaces between site medical and emergency services and hospitals.

Organization of the Report

This Office of Oversight report is organized into two volumes. Volume 1 presents complex-wide perspectives and an overall assessment of

DOE's capability to deal with emergencies. Volume 1 includes an appendix that provides a detailed discussion of generic weaknesses that need to be addressed on a complex-wide basis in order for DOE to enhance its ability to respond to emergencies, as well as opportunities for improvement and examples of good performance that can be used to benchmark improvements.

Volume 2 of this report presents Oversight's assessment of the emergency management programs at each of the ten sites/operations evaluated. The scope and methods for evaluating the selected sites/operations are discussed in Volume 2. The summary assessments in Volume 2 are condensed versions of the field reports that were provided to each site/operation reviewed during this Oversight evaluation. Each of the ten summary assessments includes an overall assessment of performance, noteworthy practices (if any), positive attributes, weaknesses, and opportunities for improvement. Sites were also provided an opportunity to identify corrective actions that they plan to implement; for the sites that elected to submit planned corrective action, a summary of the site plan is included in Volume 2.

2.0 Background

Establishing and maintaining effective emergency management systems is a challenge for any organization that has hazardous materials (e.g., DOE, Department of Defense, commercial nuclear industry, and chemical industries), for a variety of technical and organizational reasons:

- **Complex engineered systems, such as nuclear process facilities, can experience unexpected failures.** Over time, factors such as low management priority, poor maintenance and surveillance testing practices, configuration control errors, and aging systems and equipment can all contribute to latent failures that remain dormant and undetected until a triggering event occurs. When aligned unexpectedly with a triggering event and human errors, the result can be a major accident. Many serious accidents, such as Three Mile Island, Chernobyl, Bhopal, and Challenger, involved a complex series of events and/or combinations of latent equipment failures, personnel error, and breakdowns in management systems. Although the consequences were not as severe, the recent Hanford explosion demonstrates that latent failures (e.g., not emptying a tank when a process was shut down) can cause an accident even after several years and that the consequences of an accident can be magnified by human error and the confusion that often occurs after an unexpected event.

- **Emergency response involves unique organizational challenges and difficulties.** The transition from normal operations to an emergency response involves different responsibilities for personnel, new and different interactions among staff, and the need for different skills (e.g., innovation and quick decision making) than those used in the normal environment. In addition, the skills needed during an emergency are practiced only occasionally (e.g., during drills and annual exercises), and the opportunities to practice in an exercise often involve only a small fraction of management and technical personnel. Further, systems that are used only rarely may deteriorate through inattention. Such inattention is often evident in a failure to perform drills, update hazards assessments, update procedures, and reassign responsibilities after organizational changes or personnel departures. Finally, emergency management systems often receive a low priority in budgeting because they are typically an "overhead" function that is not directly tied to the success of any single program.

DOE sites face additional challenges because of its unique environment:

- **Changing hazards.** At many DOE sites, such as national laboratories, the hazards and toxic material inventories may change rapidly as new experiments/projects are started and others end. In addition, many sites are undergoing mission and facility life-cycle changes, such as the transition to decontamination and decommissioning that involve new and different hazards in comparison to a production facility. Further, many sites have been shut down but still contain hazardous materials. As demonstrated by the Hanford event, such sites can experience many unexpected events because materials are stored in a configuration that was not designed for long-term storage (e.g., plutonium cans), equipment is aging, maintenance and

routine checks are deferred, and other such reasons.

- **Changing missions, workforce, and organizational interfaces.** As the missions of DOE sites change, the nature of the work changes significantly (e.g., nuclear process operators are replaced by demolition/ construction workers). Correspondingly, sites often hire new subcontractor workers who are unfamiliar with the site, or use the existing workforce to perform tasks that they are not familiar with. In such situations, the turnover is often high, workers may not recognize a hazardous condition, and the likelihood of an error can be higher. In light of the mission and workforce changes, DOE cannot solely rely on an experienced workforce to prevent accidents or to respond correctly when an accident occurs. In addition, recent trends, such as the move to management and integrating contracts, can create additional complexity in the coordination between organizations. For example, at DOE sites that operate under management and integrating contracts, the site emergency response elements are often under the organizational control of several different contractors and subcontractors simultaneously. Privatization of DOE facilities/activities also presents unique challenges to emergency management programs, such as the need to determine whether workers on privatized efforts should be considered members of the general public or co-located workers.

The explosion at Hanford raised questions about the effectiveness of DOE emergency management programs.

Events such as the recent explosion at the Plutonium Reclamation Facility (PRF) at the Hanford Site (see text box) raised questions about the effectiveness of DOE emergency management programs. The accident at Hanford is an example of the problems that can occur if emergency management systems are not effectively implemented. For example, poor communications and coordination with the protective force resulted in several workers being directed to walk in an area where they were unnecessarily exposed to airborne chemicals, causing minor injuries.

Accident at the Hanford Site Plutonium Reclamation Facility

Accident Description and Effects

The Plutonium Reclamation Facility tank explosion occurred in May 1997. The explosion caused extensive damage to the room where the tank was located (e.g., doors were blown off their hinges, and piping and structures were bent by the force of the explosion). At the time of the emergency, the cause of the explosion was not known. Subsequent investigations revealed that the explosion resulted from a chemical reaction in a tank that had not been emptied.

No workers were in the room at the time, so no one was injured by the force of the explosion. The explosion caused a slight increase in airborne radioactivity levels for a brief period within the facility but did not otherwise result in workers being exposed to radioactive contamination or the release of radioactive materials to the environment.

Eight construction workers and an emergency responder were exposed to a plume of chemicals released from an exhaust stack as a result of the explosion. Their injuries consisted primarily of throat and eye irritation and nausea and did not involve hospitalization.

Accident Investigation Results

Following the explosion, the DOE Richland Operations Office (RL) performed a Type B accident investigation. The investigation identified a number of weaknesses in Hanford's safety management program, including deficiencies in chemical hazard assessments, implementation of procedures, and self-assessment programs. A related RL investigation focused specifically on Hanford's emergency response to the accident. The investigation of emergency response highlighted significant deficiencies in the Hanford emergency management program:

- Failure to classify the emergency in a timely manner and notify offsite agencies
- Failure to implement emergency response activities, including protective actions for workers, consistent with the take-cover order and security lockdown conditions that were declared as a result of the emergency
- Failure to take appropriate and timely actions to care for personnel exposed to uncharacterized hazards
- Failure to adequately plan and prepare for emergency response to chemical hazards.

3.0 Overview of Progress and Status

Overall Status

In the past year, some DOE sites have made considerable progress toward improving emergency management systems. However, DOE sites have not consistently developed effective emergency management programs that are capable of meeting the challenges that DOE faces. Since the first comprehensive DOE emergency management order was issued in 1987, management attention and support have varied widely from site to site and over time at the same site. Recent improvements have been substantial but are not yet sufficient to overcome years of inconsistent and sometimes inadequate attention to emergency management both at Headquarters and the field.

Recent improvements are not yet sufficient to address the full range of possible accidents.

Despite recent progress, DOE sites are still not fully prepared to cope with the spectrum of possible accidents and emergencies. The existing management systems, personnel, and equipment can generally handle smaller-scale localized events, but systems for handling complex, low-probability, high-consequence accidents need improvement. DOE sites generally have professional emergency management personnel who are well qualified to handle relatively common and uncomplicated events, such as fires and injuries. DOE has also analyzed many of the potential accident scenarios at nuclear facilities through its safety analysis processes and is prepared to take actions to mitigate them. However, DOE sites have not adequately analyzed the full range of potential accidents. For example, transportation events and sabotage have not been analyzed at many sites, and most sites have not fully analyzed accidents involving hazardous chemicals. Many of the DOE sites evaluated are not fully prepared to handle major accidents or emergencies that require a coordinated response by a number of organizations or that involve unexpected hazards (e.g., fires in buildings that have uncharacterized hazards). Because of such gaps in effectiveness, the possibility of significant error cannot be discounted, and problems similar to those noted during the 1997 Hanford explosion cannot be precluded. Accidents of sufficient magnitude to cause a significant radiological or toxicological exposure to the general public are considered unlikely. Nevertheless, DOE sites must maintain their hazards assessments, emergency action levels, and memoranda of understanding with mutual aid organizations to ensure that such accidents can be handled effectively.

Some sites have effective emergency management programs, and most are improving.

A few sites, such as SRS and INEEL, have relatively strong and mature programs; these programs need improvement in a few specific areas to address remaining weaknesses. Emergency management programs at LANL, RFETS, and Hanford have improved considerably but require continued attention to ensure that ongoing enhancements are fully and effectively implemented and sustained. Hanford, in particular, has employed a systematic project management approach to substantially improve their emergency management program over the past year. Programs at LLNL, SNL, ORNL, and NTS still have significant weaknesses, but they are improving with the support and attention of senior DOE and contractor managers. These programs are in various stages of developing program enhancements and corrective actions. NTS is in the very early stages of developing a structured emergency

management program but has the combined support of both the DOE Operations Office Manager and the new contractor. The program at TSD has significant weaknesses and has not yet established the necessary management support to ensure that the needed improvements are made.

Figure 1 provides the overall evaluation of the emergency management elements at the sites reviewed[1]. The color ratings are not intended to represent comparative or absolute grades. Rather, they provide DOE management with a perspective on areas needing the most attention. By focusing on the areas of weakness, DOE line managers can identify value-added improvements, prioritize assessments, and assign resources to emergency management programs where most needed.

The elements that are evaluated in Figure 1 are derived from DOE order requirements and delineate the essential elements of an emergency management program. They are structured to include the key elements that Oversight reviewed during field visits and to reflect the programmatic strengths and weaknesses. The offsite interface element encompasses stakeholders, such as state emergency management agencies and local hospitals. The evaluation was based on the information gathered during the field visits, summarized in Volume 2, which included observation of full-participation exercises at four of the sites.

Improved leadership and accountability are needed to address weaknesses at Headquarters and the field.

As noted in Figure 1, some emergency management elements, such as facilities and equipment and the initial response capability (e.g., fire departments and medical responders), are effective at most DOE sites. Similarly, some elements, such as categorization and classification of events (which is important for timely mitigation of events) were weak at most sites. The low ratings in the protective actions primarily reflect concerns with worker and responder safety; few concerns were identified with protection of the public. For most emergency management elements, performance varied substantially from site to site, with some sites demonstrating effective or noteworthy performance and others demonstrating significant weaknesses. Significant improvement is also needed at DOE Headquarters to address weaknesses in several areas that have contributed to inconsistent performance across DOE sites. Most importantly, improved leadership and accountability are needed to ensure that all weak areas are effectively addressed.

Tables 2 and 3 summarize positive aspects and weaknesses observed in each of the three phases of emergency management programs–planning, preparing, and responding.

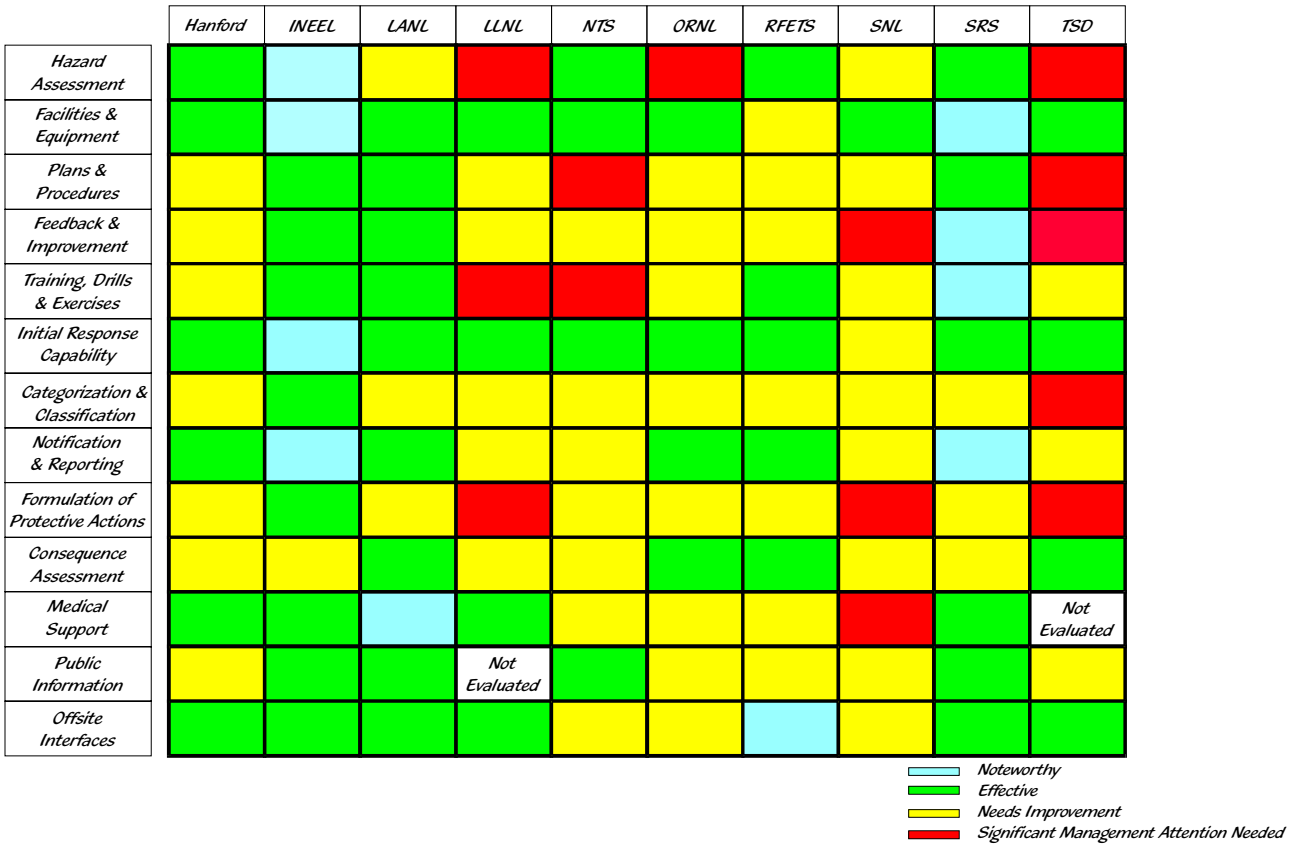
Noteworthy Practices

Essentially all of the DOE sites reviewed had adequate facilities to support emergency management systems; several sites have state-of-the-art facilities and excellent equipment. Further, the professional staff who support emergency management activities, such as fire department personnel, were generally knowledgeable, well trained, and highly experienced in their areas of expertise. Although they do not fully mitigate the weaknesses in emergency management systems, the strengths in the areas of facilities and professional staff provide a good framework upon which needed improvements can be made.

Several DOE sites have notably effective elements that can be used as "benchmarks" for improvements.

In addition to DOE-wide strengths in facilities and equipment and professional staff, Oversight noted some site-specific practices that were particularly effective or innovative. Such practices could serve as models for other sites. For example, various sites could learn from the INEEL approach to developing effective emergency action levels (EALs). Similarly, SRS and RFETS were viewed as having the most effective programs for performing DOE operations office/field office assessments of contractor performance and contractor self-assessments. The self-critical reviews by SRS were an important factor in SRS establishing an effective emergency management program and processes for continuous

[1] The evaluation applies only to the facilities and activities reviewed by the Office of Oversight. The status of development and effectiveness of emergency management programs have been noted to vary within different facilities within a site, and thus the evaluation of the individual elements does not necessarily reflect the entire site.



EVALUATED ELEMENT	BRIEF DESCRIPTION
Hazard Assessment	Quantitative analysis of the results of a release or loss of control of hazardous materials (radiological and non-radiological) which forms the technical basis for development of emergency program elements.
Facilities and Equipment	Emergency Operations Centers, fire department assets, decontamination equipment, communication equipment, and other equipment which is needed to respond to and mitigate an emergency.
Plans and Procedures	Includes the site emergency plan and emergency preparedness implementing procedures which document the processes that ensure emergency management personnel operate according to established procedures and effectively coordinate their efforts during an emergency
Feedback and Improvement	Assessments, line management oversight, lessons learned, and corrective actions designed to identify weaknesses and make needed improvements
Training, Drills, and Exercises	Programs to ensure that emergency response capabilities are adequately developed and maintained so that personnel are capable of performing their duties and that the systems are tested and verified to be effective.
Initial Response Capability	The ability of onsite personnel to effectively respond to time urgent emergencies in order to take appropriate actions to minimize the extent and severity of the event.
Categorization and Classification	Processes to promptly and conservatively classify an operational emergency based on potential hazardous material releases and the resulting impact to people in the facility, on site, and offsite using a predefined classification system that is understood by both the site and stakeholders.
Notification and Reporting	Processes for formally and promptly notifying DOE organizations, state and local agencies, and other organizations that an emergency condition exists, the classification of the emergency, and recommended protective actions for people offsite.
Formulation of Protective Actions	Timely initiation of protective actions for onsite personnel and passing of protective action recommendations to offsite authorities for local populations based on the existing hazard in order to minimize or prevent injuries and illnesses
Consequence Assessments	Prediction of the concentration and location of hazardous material plumes based on computer modeling that result from a release during an operational emergency.
Medical Support	Programs to treat personnel that have been injured or contaminated as the result of an accident or when responding to an emergency, including efforts to ensure that information on hazardous materials is available to medical personnel.
Public Information	Systems to provide timely and accurate information to the public and media, including notification of the site status and needed protective actions.
Offsite Interfaces	Interfaces with state and local emergency management organizations and mutual support organizations, such as fire departments, that are necessary to coordinate the response to an emergency.

Figure 1. Key Emergency Management Elements

Table 2. Positive Initiatives in Emergency Planning, Preparation, and Response

DOE Headquarters	DOE Operations Offices	Contractors
• Secretarial directives on emergency classification, hazards assessments, EALs, training, exercises, and vulnerability reviews. • NN-60 assessment of EALs and training on discretionary and conservative classification. • NN-60 development of performance measures and criteria for emergency management programs. • DP lead office in planning and conducting DIGIT PACE II (May 1997), which was a multi-agency, full-scale training exercise.	• RFFO oversight and assessment program for emergency management. • OAK integration of integrated safety management and emergency management and incorporation into the University of California contract. • AL participation in PRF project approach to upgrading Hanford emergency response. • Consolidated emergency plan at OR to "umbrella" all three sites under a single emergency management program. • TSD and OR processes for maintaining MOUs between Federal, state, tribal, and local organizations and mutual aid organizations. • RFFO and RFETS strong relationship with State of Colorado and stakeholders. • NV emergency management upgrade including co-locating of the emergency management center, fire department, and communication center. • AL establishment of public information processes and training for public affairs staff.	• Fluor Daniel PRF incident response project approach for improving emergency management at Hanford. • INEEL and RFETS development of comprehensive EALs including a strong technical basis, protective actions, and a common format. • SRS electronic emergency operations center (EOC) status boards including interface with state EOCs and Web site access. • SNL family crisis center. • INEEL chemical vulnerability review in response to Secretarial directive. • Emergency response teams including LANL hazardous material and TA-55 emergency response teams, and INEEL incident response teams. • LANL integration of medical services into emergency management and response. • SRS emergency response facilities including EOC, TSC, and 24-hour operations center. • INEEL integration of all site facilities under a single emergency management program. • LANL emergency program upgrade and improvement since 1994 Porcupine exercise. • Kaiser Hill's and subordinate Rocky Flats contractors' aggressive program to eliminate hazardous materials.

improvement. Other sites can also learn from experience at RFETS in developing a "partnership" with their stakeholders, which includes significant community involvement in areas such as review of hazards assessments.

A list of noteworthy practices to implementing various emergency management system elements is included in the text box on page 17. Volume 2 provides additional details on each of these noteworthy practices.

Weaknesses and Impacts

Every site reviewed had weaknesses in some aspects of emergency management, although the degree and significance of the weaknesses varied considerably. Such weaknesses hinder DOE's ability to effectively manage emergencies and thus could impact the health and safety of the public or the workforce. For example, poorly trained personnel can make errors that can turn a relatively minor equipment failure into a major accident. Weaknesses in emergency management programs can also delay needed protective actions or result in increased consequences of an event. For example, contamination or exposure could result if people are sent into a hazardous area without proper equipment; if the site does not know the location and quantities of hazardous materials, it will not know what areas may be hazardous.

Table 3. Examples of Deficiencies in Emergency Planning, Preparedness, and Response

DOE Headquarters	DOE Operations Offices	Contractors
EMERGENCY PLANNING		
• Roles, responsibilities, authorities unclear. • Multiple program office plans and programs. • Lack of central point of line management leadership. • Programmatic evaluations not performed by NN-60 or EH. • DOE Order 151.1 deficient in assuring timely classification, notification, accountability. • Lack of DOE-wide policy on status and integration of privatized workers and activities.	• Not engaged in monitoring and assessing contractor performance. • Roles, responsibilities, and authorities not clear. • Lack of effective processes for timely review and approval of contractor submittals. • MOUs with states and mutual aid organizations outdated. • Responses to Secretarial memoranda not critically reviewed. • Contract language and accountability not established for emergency management. • Individual accountability lacking for DOE emergency response organization (ERO) management and staff.	• Hazards assessments incomplete or outdated. • EALs lack technical bases, conservatism, or usability. • Emergency procedures poor quality, outdated, or in draft. • Responses to Secretarial memoranda not realistic or reflective of existing deficiencies. • Planning for consequence assessment and protective actions inadequate. • Inadequate planning for public information including facilities, equipment, and training. • Not incorporating benchmarking and lessons learned into programs and planning. • Failure to plan for response to transportation issues onsite.
EMERGENCY PREPAREDNESS		
• Headquarters Executive Team and program office personnel not trained or proficient. • Executive Team not routinely participating in exercises (simulated). • Program offices not routinely participating in exercises; EM did not participate in the 1997 Hanford exercise. • Program offices not engaged in or monitoring preparedness.	• DOE ERO personnel not participating in training/retraining. • DOE not critically evaluating contractor preparedness exercises. • DOE ERO staffing inadequate, with high turnover. • DOE ERO not participating in adequate drills and exercises. • Downsizing and funding reductions impacting DOE's, contractors', and stakeholders' preparedness.	• ERO personnel not participating in training and retraining. • Training deficient in: - Classification - Consequence assessment - Protective actions - Command and control - Public information • Inadequate ERO participation in drills and emergencies to maintain proficiency. • Inadequate participation in drills and exercises by external organization. • Not giving failing ratings and redemonstrating unsatisfactory exercises or elements. • Exercises not effective due to unchallenging or compromised scenarios, excessive simulations, or breaking annual exercises into phases.
EMERGENCY RESPONSE		
• Headquarters Executive Team did not participate in exercises in 1998, including Hanford. • Executive Team has not demonstrated effective support to field and interface with other agencies. • Confusion and a lack of proficiency evident in DOE Headquarters response. • Multiple Headquarters requests for information from field impedes response. • Executive Team inappropriately took control of an actual emergency. • Roles in interfaces on release of public information not clearly defined or understood.	• DOE emergency manager denied contractor request to upgrade emergency classification during an exercise. • DOE emergency managers failed to correct improper classification by contractor during exercises. • DOE EOC provided incorrect or outdated emergency information to Headquarters EOC during exercises. • Significant delays in approving and issuing press releases during exercises. • Incorrect or outdated information provided in press briefings and releases during exercises.	• Delays in classification and protective actions. • Protective actions for emergency responses inadequate, including entry into plumes during an exercise. • Significant delays in search, rescue, and medical treatment for exercise victims. • Dose and exposure information for victims not provided to hospital during exercises. • Failure to use or adhere to procedures and EALs. • Inadequate emergency communications and coordination, both internal and external, during exercises. • Competency and proficiency problems in consequence assessment and protective actions. • Command and control weaknesses in EOCs and the field.

NOTEWORTHY PRACTICES

- Emergency response training and drill program that is comprehensive, integrated with other site emergency response elements and includes regular casualty drills to maintain proficiency (SRS).
- Strong and effective self-assessment process including assessment criteria and checklists for evaluating emergency management and achieve continuous improvement (SRS).
- State-of-the-art emergency response facilities and effective and well-maintained emergency response equipment (SRS and INEEL).
- Hazards assessments, emergency action levels, and emergency response organizations that are effectively designed to support timely and conservative classification of emergencies and notification of stakeholders (INEEL).
- Training and qualifications of personnel who provide the initial response to emergencies, such as fire department, medical technicians, and incident response team personnel (INEEL).
- Medical support fully and effectively integrated into sitewide emergency preparedness, planning, and response activities, including participation in exercises and exercise scenario development (LANL).
- A hazardous materials response team that is competent, well trained, and fully equipped to respond to radiological and chemical emergencies both on and off site (LANL).
- A Family Assistance Center for emergencies to provide support and assistance to families of emergency victims, including good participation by the Laboratory, Red Cross, and emergency response organizations (SNL).
- Close working relationships with state and local agencies, including stakeholder participation in review of emergency management program elements such as hazards assessments (RFETS).

Generic weaknesses in emergency management were evident at many sites.

Weaknesses can impact DOE's credibility with stakeholders if DOE sites do not effectively communicate information to stakeholders and the public. Further, if DOE is not perceived as forthcoming about a site's status, DOE loses the confidence and support of state and local agencies. Ineffective emergency management can also have financial and legal impacts (e.g., lawsuits from injured persons).

Several weaknesses were evident at many sites. These "generic" weaknesses include:

- **Hazards assessments and protective actions.** Hazards assessments provide the foundation for the emergency management program, including the development of EALs, emergency procedures, and protective actions. Despite the Secretary's mandate to assure that all hazards assessments be updated by March 31, 1998, hazards assessments at several sites were not developed, did not reflect current hazards, or lacked an adequate technical basis.

- **Event classification.** Event classification and EALs are essential in ensuring that appropriate actions are taken to mitigate accidents and notify the appropriate authorities. Some DOE sites have not established procedures, training, drills, exercises, and competencies that provide

Field Monitoring Team performing environmental sampling in an exercise

assurance that events will be classified in a timely and conservative manner.

- **Performance feedback mechanisms.** DOE and contractor management oversight, critical assessment processes, and feedback mechanisms have not been effective in ensuring adherence to requirements and expectations, identification and resolution of significant weaknesses, and continuous improvement.

- **Worker safety and treatment.** Much of DOE's attention has been devoted to analyzing accidents that could affect the general public. DOE sites have not placed sufficient emphasis on protecting and treating workers by ensuring that hazards and risk assessments, work planning and control, consequence assessment, search and rescue, protective actions, and medical treatment adequately address site workers who could be affected by accidents at DOE sites.

- **Training, competencies, and proficiency.** Competent personnel, who are capable of recognizing hazardous conditions and taking appropriate actions, are the most important factor in preventing and mitigating accidents. Training, drills, and exercises have not been effective in ensuring the continuing competency and proficiency of personnel with emergency management responsibilities and decision-making authority.

- **Stakeholder and public interfaces, coordination, and information.** Most states cited improving relationships with DOE sites on emergency management. However, they indicated a perception that DOE's notification of events and accidents was not always timely and expressed concerns that reduced DOE funding would jeopardize state and local emergency operations centers and the ability to respond to DOE emergencies. In addition, many agreements or MOUs with external support organizations are not current, and the information provided to the public and the media during emergency exercises was not consistently timely or accurate.

- **DOE emergency management order.** Some provisions of DOE Order 151.1, Comprehensive Emergency Management System, are unclear or require modification. DOE and contractor leadership, management followup, and accountability have not been sufficient to ensure that the order is effectively implemented, contributing to continuing weaknesses in emergency management and response and varying levels of performance across the DOE complex.

Because they are so prevalent, these generic weaknesses need to be addressed from a DOE-wide "corporate" perspective, as well as by individual sites. Section 4 of this report provides a detailed discussion of each of the above issues, including specific opportunities for improving policy, program management, and performance.

Response to the Secretarial Direction Following the Hanford Accident

Although much work remains to be accomplished, the Hanford Site has made significant progress toward establishing an effective emergency management program. In addition, the Secretarial direction to improve emergency management programs has had a positive effect at most other sites by focusing site management awareness on emergency management issues. In the past year, DOE Headquarters and DOE sites have completed some of the actions specified in the Secretarial direction and have made some improvements. However, the Secretarial initiatives have not yet been fully embraced, and weaknesses identified in the Secretary's directives have not been adequately addressed at some sites (see Table 4).

Hanford has made substantial improvements, and most sites have made progress. However, some DOE sites have not addressed the types of problems that led to the Hanford explosion or the inadequate response to the accident.

Eight months after Secretarial direction to improve hazards assessments and response capability, some DOE sites have not addressed the

types of problems that led to the Hanford explosion or the inadequate response to the accident. Despite specific Secretarial direction to classify emergencies conservatively, several sites lack the necessary information (e.g., hazards assessments and EALs), and some local classification guidance is non-conservative. Further, although NN-60 and DP have provided training, DOE Headquarters and site efforts have not adequately ensured the training, qualifications, and proficiencies of personnel who perform emergency management functions. Perhaps most significantly, many personnel did not have a good understanding of their responsibilities. This is a particular concern for facility managers, who typically make critical decisions early in an event, such as initial classification and protective actions. A substantial fraction of such personnel were not able to quickly classify an emergency and correctly apply EALs when given credible hypothetical scenarios during tabletop exercises.

LLNL has begun to redesign their emergency management program within the integrated safety management framework.

In accordance with the Secretary's direction, sites were to submit a report on the status of action items by December 31, 1997, and to complete upgrades and corrective actions by March 31, 1998. DOE sites have all submitted the status reports as required by the Secretary's memoranda. Several sites have completed some upgrades and corrective actions and initiated others. Some sites, such as NTS, recognized that their programs had significant weaknesses and have initiated efforts to improve. In response to the Secretary's direction and an Office of Oversight safety management evaluation, LLNL has begun to redesign their emergency management program within the framework of the DOE integrated safety management initiative.

Although sites submitted their status reports, the correction actions they identified were not always adequate to meet the objectives. Some sites reported that they had adequate hazards assessments because they had approved safety analysis reports (SARs). However, the SARs often did not have the right type of information to also serve as an emergency management hazards assessment. Further, emergency management programs at some sites did not incorporate the information available from existing hazard analyses into EALs and emergency procedures.

The sites' reports to the Secretary provide an overly optimistic picture of the actual status.

Based on a comparison of selected site reports to the Secretary and the actual status of emergency management programs, the site reports provide an overly optimistic picture of the actual status. In general, the site reports identify few significant problems, while a more detailed assessment of the actual status reveals that the programs have significant weaknesses. Several factors have contributed to this situation:

- Expectations for performance by DOE and contractor management are not in line with DOE policy, and thus mediocre and even substandard performance is not recognized as such.

- DOE and contractor management did not perform sufficient critical reviews of the site submittals to the Secretary to verify that the submittals were accurate and that performance was indeed adequate.

- Some responses were less than accurate. For example, sites reported that EALs were established when the EALs were actually outdated, incorrect, and not used in responding to emergencies.

- Some DOE and contractor managers do not have a realistic understanding of the status and performance in various aspects of emergency management within the field on such subjects as hazards assessments and EALs, consequence assessment capabilities, training and compentencies, programs and procedures, and coordination with state and mutual-aid organizations.

Overall, Secretarial direction has had a positive impact but has not yet resulted in the desired level of performance improvement at some DOE sites. Further, the reports on status and progress provided by the sites in response to the Secretarial direction provides an overly optimistic picture of actual performance and a corresponding false sense of security.

Table 4. Effectiveness of Response to Secretarial Initiatives on Emergency Management

Issue: This evaluation, completed one year after the Hanford event, indicates that some field responses were not sufficiently self-critical and representative of actual performance, that some sites did not take adequate advantage of lessons learned, and that some of the same weaknesses in emergency response could still be seen today.

Reference	August 4, 1997 Memorandum from the Secretary of Energy (Subject: DOE Response to the May 14, 1997 Explosion at Hanford's Plutonium Reclamation Facility)	August 27, 1997 Memorandum from the Secretary of Energy (Subject: Lessons Learned from the Emergency Response to the May 14, 1997 Explosion at Hanford's Plutonium Reclamation Facility)
Actions Directed to the Field	• Scrutinize the use or storage of chemicals that have potential for explosion, fire, or significant toxic release. • Reassess known chemical and radiological vulnerabilities at facilities that have been shut down, are in standby, are being deactivated, or have otherwise changed their conventional mode of operation. • Assess the technical competence of staff to recognize the full range of hazards in facilities. • Assess the site lessons-learned and occurrence reporting programs.	• Train key emergency management personnel on conservative emergency management decision-making. • Assure availability of personal protective equipment, field monitoring equipment, and qualified personnel for emergency response and post-accident activities. • Update emergency procedures to assure that timely medical attention is provided to injured or potentially exposed personnel. Confirm that procedures are implemented for the notification and protection of workers in a variety of locations (indoors and outdoors) at event onset, and that methods are available to control their sheltering. • Implement procedures to provide local medical facilities with available information on chemical and radiological hazards as well as timely qualitative and quantitative exposure information for individuals.
Evaluation Findings	• In general, reviews conducted by most sites for storage of chemicals and reassessment of known vulnerabilities lacked rigor. Notable exceptions included thorough and meaningful vulnerability reviews at INEEL and proactive chemical vulnerability reductions at RFETS. • Exercise, drill, and tabletop walk-through performance of emergency responders indicates continued weaknesses in their understanding of the nature and magnitude of hazards in facilities. • Most sites did not have an effective lessons-learned program for emergency management. Additionally, there are significant weaknesses associated with trending and analyzing deficiencies to identify root causes and develop corrective actions to fully address known problem areas.	• Training was conducted at all sites on conservative emergency management decision-making; however, its effectiveness was impeded by an absence of strong management policy and followup to institutionalize conservative decision-making through EALs and emergency procedures. Lack of conservative decision-making was identified as a weakness during exercises and tabletop walk-throughs at multiple sites. • In general, there is an excellent initial emergency response capability at DOE sites in terms of both qualified personnel and available equipment. The ready availability of field monitoring personnel (such as radiological control technicians and industrial hygienists) to support post-accident activities varied from site to site. • It was observed during exercise and drill performance that many sites have not yet established effective policy, procedures, and plans to assure timely treatment of potentially contaminated personnel. Emergency response personnel were observed to be unfamiliar with the nature and extent of hazards present. This shortcoming interfered with effective triage for treatment of personnel with simulated serious injuries. In one exercise, emergency medical treatment was delayed for more than three hours due to problems in this area. • Progress continues to be required in coordination with local medical facilities. Several MOUs between DOE sites and local hospitals were found to be out of date. In exercises involving local medical facilities, communication of exposure or contamination information was weak. • Several sites were unable to demonstrate adequate provisions for making prompt protective action notifications to onsite personnel during emergency situations and emergency responders traversed radiological or chemical plumes during exercises.

Table 4. Effectiveness of Response to Secretarial Initiatives on Emergency Management (cont.)

Reference	August 27, 1997 Memorandum from the Secretary of Energy (Subject: Timely Notification of Emergencies and Significant Events)	December 16, 1997 Memorandum from the Deputy Secretary of Energy (Subject: Follow-on Actions to Improve Emergency Event Recognition, Classification, and Notification)
Actions Directed to the Field	• Review the criteria (e.g., EALs) used to determine emergency and significant event recognition and categorization to ensure that all reasonable event indicators are adequately covered by procedures and that procedures reflect an expeditious process. • Review training and conduct "refresher" training and drills for personnel responsible for event categorization and notification to ensure that they understand the emphasis on the timely completion of these activities. • Solicit the comment of other Federal, state, local, and tribal agencies regarding timely notification of events.	• Complete updates to EALs by March 31, 1998. The EALs should cover the full range of accident scenarios and be effectively integrated with decision-making aids involving onsite protective actions and offsite protective action recommendations. • Complete emergency preparedness hazards assessments by March 31, 1998. • Ensure that procedures identify authorities and responsibilities for emergency event classification, notification, and protective action decision-making, and emphasize timely decision-making. • Complete a major emergency response exercise by September 30, 1998.
Evaluation Findings	• While most sites had updated EALs, they varied in effectiveness and coverage of all reasonable event indicators. Criteria for effectively evaluating transportation emergencies was lacking at all sites. Many sites had significant weaknesses associated with EALs, including outdated and incorrect EALs and EALs that were not used. The design and structure of the INEEL EALs was identified as a noteworthy practice. • Several sites had insufficient procedures and capability to perform timely emergency classification and notification. Some sites indicated a preference to assemble a staff of technical experts to review facts about the emergency before making an emergency classification; this practice could result in significant delays. • States and local stakeholders report that DOE sites are making improvements in the area of timely notification of emergencies, but continued emphasis is still required.	• Hazards assessments and EALs have not yet been completed or updated at some sites and were considered a low priority at one site. The deadline of March 31, 1998, has not been met in several instances. • Deficiencies in the quality, currency, or thoroughness of hazards assessments and EALs were not recognized or reflected in some responses. • Improvements continue to be required in hazards assessments to ensure that source terms are adequately characterized, that analysis is comprehensive, and that formal mechanisms exist to trigger updates when hazards change. • Improvements are also required for EALs and site/facility emergency plans and procedures to ensure that classification, notification, and implementation of protective actions can be completed in a timely manner during emergencies. • Sites have conducted or scheduled emergency response exercises. However, some of these exercises have not included the participation of states or joint information centers and thus have not tested some critical emergency functions, such as public information or coordination with local medical facilities. Additionally, for emergency exercise performance that is not satisfactory or failed in whole or in part, there is no requirement to repeat the exercise (or a portion of the exercise) to demonstrate adequate capability.

4.0 Summary Assessment of Emergency Management Performance at Each Organizational Level

All levels of the DOE organization—from DOE Headquarters to the operations offices to the contractors—have important roles in emergency management programs, which are defined in DOE Order 151.1, Comprehensive Emergency Management System. Figure 2 summarizes the responsibilities of various organizational elements. In addition, DOE has many important interfaces with external organizations, such as state governments, tribal governments, local governments, local hospitals, and local fire departments. Figure 3 shows how the three levels of DOE's organization (Headquarters, the operations offices, and the sites and contractors) are intended to interact in an emergency situation that involves activation of the emergency operations centers (EOCs).

As shown previously in Tables 2 and 3, each organizational level exhibited positive aspects and weaknesses in implementing their responsibilities for emergency management planning, preparation, and response.

DOE Headquarters Level

DOE Headquarters includes both line and non-line management organizations. Line management is the chain of command from the Office of the Secretary of Energy through the program cognizant secretarial offices and the Office of Field Management, to the operations and field offices, to the site-specific operating contractors and subcontractors. Other DOE organizations (non-line management) that have important roles in the emergency management program include the Office of Public Affairs (emergency information management), the Office of Emergency Management (NN-60) within the Office of Nonproliferation and National Security (NN), and the Office of Oversight within EH. During an emergency, DOE has an Executive Team that monitors activities to ensure that objectives are met and provides information and interfaces on a regional and national level.

Program office management has consistently supported facilities and equipment upgrades at DOE sites.

Line organizations (DP and EM) have ongoing efforts to improve emergency management, and program offices have consistently supported the field's needs in facilities and equipment. DP has been supportive of field elements through technical assistance and training efforts. EM has taken an active role in developing directives associated with the transportation of waste. NN-60 has historically developed policy and guidance, provided technical assistance, evaluated field exercises, and managed the Headquarters EOC. Most recently, Secretarial directives on emergency classification, hazards assessments, EALs, training, exercises, and vulnerability reviews have been initiated. The management systems approach delineated in DOE Order 151.1 has been a significant step in fostering a comprehensive, integrated approach to emergency management on a DOE-wide basis.

DOE Headquarters needs to improve organizational interfaces and ensure accountability.

Nonetheless, the weaknesses in emergency management evident in the Hanford explosion in 1997, and still evident at many DOE sites, result in part from management inattention, poor organizational interfaces, and the lack of accountability for corrective actions at the Headquarters level

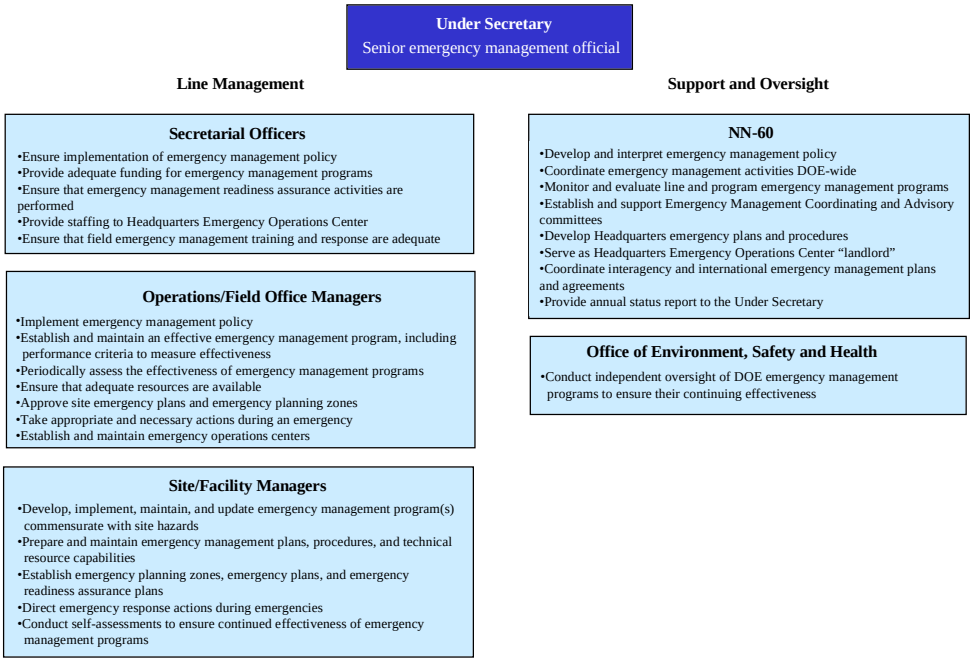


Figure 2. Responsibilities Under DOE Order 151.1

in both line and non-line organizations. Clear policy and strong leadership are needed to strengthen coordination between all parties involved, critically monitor performance and resolve deficiencies, share good practices and lessons learned, and continuously strengthen efforts to prevent, mitigate, and respond to potential events and accidents. Clear identification, communication, understanding, and implementation of roles, responsibilities, and authorities within DOE are needed to achieve effective emergency management programs and ensure accountability for performance.

The Secretary of Energy and the Deputy Secretary of Energy have demonstrated leadership by directing improvements in emergency management at DOE sites.

The report of a previous evaluation by EH, "Emergency Management at Department of Energy Headquarters" (July 1995), identified such deficiencies as overlapping line management responsibilities exercised by multiple line management and non-line management organizations; lack of effective cooperation/ coordination among Headquarters elements; and ineffective mechanisms for identifying and resolving emergency management problems. Headquarters organizations have not taken ownership of, or been held accountable for, correcting these weaknesses. As a result, the deficiencies identified in the 1995 report are still evident three years later. Similar deficiencies were evident in assessment reports dating back as far as 1973. The Secretary of Energy and the Deputy Secretary of Energy have demonstrated leadership by recognizing that the Hanford explosion could be an indicator of more widespread problems and directing the field to implement specific improvement initiatives. Similar direction needs to be focused on improving management systems at the Headquarters level.

Department policy, as reflected in directives, is comprehensive in defining many elements of emergency management systems, assigning responsibility, and providing direction and guidance.

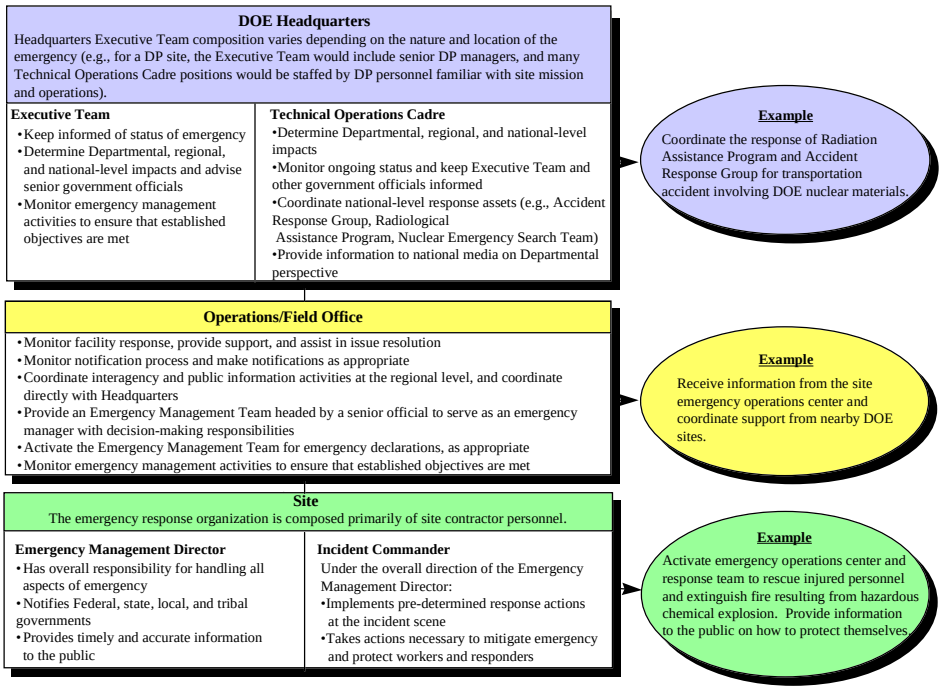


Figure 3. Typical DOE Emergency Management Hierarchy During Emergency Operations Center Activation

These directives establish the roles for policy and guidance, line program implementation, and independent oversight. However the roles and responsibilities delineated in DOE Order 151.1, Comprehensive Emergency Management System, have not been implemented through a clear strategy and approach that defines the day-to-day integrated roles, responsibilities, and authorities within and between all line and support organizations for both programmatic activities and response to operational emergencies. In addition, the acceptance and implementation of policy, as reflected in DOE Order 151.1 varied significantly across the DOE complex as discussed under Generic Weakness #7 in Appendix A.

Working committees have not been effective in improving policy and ensuring consistent guidance to the field.

Efforts to establish working committees to integrate the emergency program and establish a forum for policy development and interpretation have not been successful. For example, the Emergency Management Advisory Committee and the Emergency Management Coordinating Committee no longer meet routinely and have not been effective in resolving generic weaknesses in emergency management programs. Similarly, relationships between program offices and NN-60 are characterized by conflicts in policy interpretation, conflicting guidance to field programs and external agencies, and duplicative roles in providing technical assistance and monitoring performance. The relationship for emergency management between NN-60 and one program office was described as a “memo war.”

The Headquarters Executive Team has not received training and has participated in few exercises.

With respect to the management of an operational emergency, the Headquarters-level line managers have not committed to the training, drills, and exercise efforts needed to ensure individual and organizational proficiency. The Headquarters Executive Team has not received training and has not participated in many of the major exercises. Recognizing the numerous competing responsibilities for senior managers, a different structure for Headquarters response to an emergency may be warranted. The roles, responsibilities, and expectations for the Executive Team have not been clearly communicated, understood, and implemented during activation of the Headquarters EOC. Interviews with field personnel indicate a concern that members of the Executive Team have inappropriately assumed control of efforts to respond to and mitigate an actual emergency. Field personnel were particularly concerned that Headquarters would attempt to "micromanage" during an emergency, even though most Headquarters personnel lack the site-specific experience and knowledge, and few have participated in enough exercises to provide effective direction. Field personnel cited examples where Headquarters personnel overstepped their defined role during emergency management exercises and actual events (i.e., the responsibilities delineated in DOE Order 151.1 call for Headquarters only to provide support and interface with other agencies in emergency response). In doing so, Headquarters did not provide constructive assistance and was a distraction to the emergency management efforts in the field. In addition, the Headquarters support roles regarding the release of public information during an operational emergency are not clearly understood or well integrated into field public information activities. These weaknesses are acknowledged by many DOE managers and have been reflected in past reviews, exercises, and status reports by NN-60. However, efforts to correct them have not been aggressive, comprehensive, or successful.

Inconsistent and fragmented direction and leadership at the Headquarters level contribute to weaknesses in both Headquarters and field emergency management programs. As the DOE focal point for DOE Headquarters emergency management programs, NN-60 has attempted to provide direction and leadership through such efforts as defining a comprehensive concept of emergency operations and drafting order revisions to address transportation activities. However, these efforts have been delayed in separate negotiation efforts with the individual line programs and have not yet been successful. For example, the Draft Headquarters Emergency Management Plan was provided to each line program office in early 1997, but NN-60 has never established a deadline for revising and completing the draft plan, and implementing procedures have not been established. Similarly, Headquarters program offices have not been able to agree on a concept of operations for Headquarters.

DOE needs to focus responsibility and authority for emergency management on a central line organization that has cross-cutting authority.

DOE needs to consider focusing responsibility and authority for emergency management on a central point of leadership that has cross-cutting authority. Such an approach is needed to foster a corporate approach and make improvements that cannot be achieved by a non-line office such as NN-60 or any single program office. A central point of leadership could be responsible for assessing line programs at the Headquarters level, assessing the uniformity and effectiveness of approaches, ensuring appropriate strategic planning and resources, ensuring that corrective actions are implemented and effective, ensuring accountability for performance, and interfacing with the sites and NN-60 on policy interpretation, program requirements, performance assessment, and line oversight.

Site contractors have primary responsibility for emergency response and management, and DOE field elements have primary responsibility for administration, support, and oversight of day-to-day operations. However, these responsibilities cannot be implemented without Headquarters line management support and funding. The program offices' approaches for funding, planning, training, analyzing appraisal deficiencies, and facilitating technical assistance vary considerably. In some instances, a lack of Headquarters line management involvement contributed to program deficiencies. For example, ER had not analyzed funding requests

to ensure that adequate resources were being requested and provided to support all required hazards assessments at ORNL with the exception of the ORNL High Flux Isotope Reactor, which is operated by NE and funded by ER. In addition, EM management and staff were generally not knowledgeable or assigned specific responsibility for ensuring that an effective and coordinated emergency management system was in place at the field office and site level. EM roles, responsibilities, and authorities for emergency management have been further confused by recent reorganizations, shifting of responsibilities between offices, and management turnover. EM has not routinely participated in site annual exercises and elected not to participate in the most recent exercise at the Hanford Site, despite the concerns raised by the 1997 event.

DP plays an active role in managing DOE radiological emergency response assets (not assessed within the scope of this Oversight evaluation). DP has been more active than other line programs in supporting field emergency management programs by providing training courses and technical assistance, conducting evaluations, and participating in exercises. In the case of LLNL, this support has clearly helped facilitate recent improvements. These actions have been less effective at TSD, SNL, and NTS, which were among those sites judged to need the most attention to improve emergency management programs. Additional coordination between DP and NN-60 is needed on efforts such as training courses. In addition, coordination between NN-60 and DP was less than optimal in the planning for the TSD DIGIT PACE II exercise with respect to developing agreements with external Federal stakeholders.

NN-60 has several initiatives to improve emergency management.

NN-60 has taken several steps at the direction of the Secretary in an effort to improve the Department's emergency management system since the Hanford event in 1997. These initiatives have included:

- Reviewing emergency and significant-event recognition criteria throughout the DOE complex
- Reviewing training and conducting refresher training for personnel responsible for event categorization, notification, and reporting
- Contacting offsite agencies to improve timely notifications of all events of concern
- Conducting a special review of EALs and associated event categorization criteria
- Conducting emergency management decision-making training for key personnel
- Initiating development of performance measures and criteria for emergency management programs.

These efforts have not yet been demonstrated to be effective in improving systems on a DOE-wide basis. Some NN-60 efforts, such as annual reports, have not been performed as required by DOE Order 151.1. NN-60 had not issued the required annual report to communicate information on the status of the Department's emergency management system until recently, when it issued the *Annual Report on the Status of the Department's Emergency Management System for 1997*. In addition, NN-60 exercise evaluations did not address programmatic weaknesses that led to deficient performance.

The primary roles of NN-60 are to provide policy and guidance, training, technical assistance, exercise evaluations, and management of the Headquarters EOC. NN-60 does not have a line management function and does not have authority to direct line program activities or corrective actions. As discussed previously, coordination between NN-60 and program offices has not always been effective in resolving issues. In addition, the ability of NN-60 to promote and ensure effectiveness at DOE sites is limited by a number of factors; for example, exercises do not have clear pass/fail criteria, there are no effective processes to ensure that corrective actions are implemented, exercise evaluations are not performed at all sites, and NN-60 has had difficulty gaining support within the Office of Nonproliferation and National Security (NN) organizational structure. Some of these factors can be readily addressed by ensuring better coordination between NN-60 and a central point of line management leadership.

Notwithstanding these barriers, NN-60 needs to be more proactive in providing value-added assistance and promoting improvement. The contributions of NN-60 to continuing performance improvement could be strengthened through:

- Increased authority for access to all DOE sites for purposes of exercise evaluations and program reviews.
- Conduct of periodic evaluations of Headquarters and field programs
- Authority to assign failing grades to emergency management exercises or elements of exercises that are unsatisfactory and to require retesting
- Authority to require corrective action plans for identified deficiencies
- Increased internal support within the NN organization for emergency management and NN-60 activities
- Partnering and support from within a central point of line management leadership, to empower the above authorities, and to promote lessons learned, benchmarking, generic issue resolution, and a more consistent level of emergency management program effectiveness across the DOE sites.

Effective feedback is needed to promote improvements and share lessons learned.

An effective assessment and feedback function within DOE Headquarters is essential to ensuring that the senior DOE managers are aware of the status of emergency management programs across the complex. Effective feedback can promote continuous improvement across DOE and timely identification and resolution of weaknesses. Until the past year, the combination of NN-60 technical assistance and EH independent oversight has been limited in its contribution to effective performance assessment, feedback, and continuous improvement:

- NN-60 has not historically conducted comprehensive programmatic reviews of DOE operations offices and sites.
- The role of NN-60 in providing technical assistance in the evaluation of field exercises has not been clearly distinguished from the EH independent oversight function.
- The involvement of NN-60 in exercise evaluation results primarily from the cooperation of the sites, and some sites no longer request this assistance.
- Except for the followup review of LLNL during this Oversight evaluation, EH and NN have not conducted followup of emergency management weaknesses to ensure timely and effective resolution of weaknesses and issues identified in emergency management programs.
- Management systems have not been established to coordinate EH and NN assessment efforts and share information, and for NN-60 to systematically follow up on the weaknesses identified in the field in their technical assistance role.

As the Department continues to move to full implementation of DOE Order 151.1 by September 30, 1999, additional efforts are need to enhance the organizational partnership envisioned by this policy. Leadership is needed to bring the Headquarters cognizant secretarial offices, the Office of Field Management, operations offices, NN-60, and EH together to forge improvements in the Department's emergency management program.

In summary, significant attention is needed to address longstanding issues at DOE Headquarters, including a need for consistent Headquarters leadership, clear roles and responsibilities, and improved policy. Section 5 presents opportunities for improvement that should be considered when addressing these issues.

DOE Operations Offices

DOE Order 151.1 specifies that operations office[2] managers are responsible for implementing an effective integrated emergency management program that reflects DOE policy and requirements at sites under their jurisdiction. The order calls for operations office managers to partner with cognizant secretarial offices, FM-1, NN-60, and EH-1 to establish and maintain an emergency management program and to incorporate emergency management program requirements into contracts.

[2] Throughout this report, the term "operations offices" is used to refer to DOE field elements that have responsibility for specific sites. For most of the sites reviewed, the operations office was the responsible DOE field element. Some AL sites, such as SNL and LANL, have DOE area offices that report to the AL Manager and are responsible for day-to-day interface with the contractor. RFFO reports to EM and has responsibility for RFETS.

Continuing DOE reductions in funding and resources make it difficult to improve and sustain emergency management capabilities.

Over the past five years, various responsibilities and authorities have transitioned from Headquarters to the field in accordance with the ongoing DOE initiatives to empower the field. This restructuring of responsibilities has given the operations offices additional responsibility and authority for implementing field office emergency management programs and ensuring that contractors establish effective and efficient emergency management programs. During this same period, a number of problems have made it difficult for field managers to implement emergency management. Continuing DOE reductions in funding and resources can make improving or even maintaining effective emergency management capabilities difficult. The shift at some sites to an integrating contractor, with multiple subcontractors, can increase the complexity of organizational interfaces and command and control during an emergency. Changing facility life cycles, decontamination and decommissioning, and environmental cleanup have brought new and unique challenges to worker safety and emergency planning. Increased privatization of cleanup work and leasing of DOE facilities for non-DOE work also present unique requirements and interfaces for emergency management programs. The interfaces with DOE Headquarters also present challenges, including inconsistent direction from multiple program offices, low Headquarters priority for emergency management funding and improvements, continuing Headquarters reorganization and management turnover, and a failure of some DOE Headquarters elements to actively participate in emergency management training and exercises.

Some DOE operations offices have established effective emergency management programs, and others have made significant progress.

In the midst of these challenges, some DOE operations offices have managed to be reasonably successful in establishing an effective emergency management program, and others have made significant improvements and progress in the last year or two. SR has effectively teamed with the contractor to build one of the most mature and effective DOE programs. Although there are still specific areas in need of further improvement, the SRS emergency management program has many features that could serve as a benchmarks for the DOE complex. Their emergency response facilities and equipment are state-of-the-art and represent a significant DOE and contractor commitment in a time of limited resources and funding. Both SR and the contractor have established and implemented aggressive and effective line management oversight and self-assessment of the emergency management program, including periodic evaluations and critical review of drills and exercises. Detailed performance criteria have been developed to ensure the proper level of performance expectations and consistency in assessments.

Several operations offices and their contractors have managed to make significant improvements in emergency management and preparedness. Others are still in the early stages of planned improvements. The improvement initiatives are frequently reactive to an actual event or to a poor program evaluation or exercise evaluations, rather than the result of proactive management and effective performance feedback mechanisms.

RL has been aggressively engaged in driving and achieving substantial upgrades and improvements in emergency management and response over the past year. A formal project, the PRF incident response project, was established as the mechanism for achieving rapid and significant improvement and for actively involving all Hanford contractors; DOE, state, and local organizations; and stakeholders. The effectiveness of this ongoing project was demonstrated through both a successful full-scale emergency exercise in June 1998 and response to an actual January 1998 event involving the discovery of a potentially explosive chemical substance (picric acid) in a facility. Although progress has been made, RL still faces challenges associated with validating and closing 75 percent of the 105 corrective actions, improving coordination between DOE and the contractor during emergencies, and strengthening dissemination of timely and accurate public information.

In coordination with AL and LAAO, the LANL contractor has made significant improvements since the poor performance on the "Porcupine" exercise in 1994. Neither NN nor

EH has performed an evaluation of LANL emergency management programs or exercises since 1994. Significant improvements since that time represent a DOE and contractor commitment to emergency management. AL and LAAO have recently revised the contract with the University of California, the operating contractor, to include DOE Order 151.1 and emergency management response measures. This is an important step toward achieving accountability and effective performance. Unfortunately, two other emergency management programs under the purview of AL have not made sufficient progress. The emergency exercise conducted at SNL (see text box) demonstrated many of the same weaknesses identified in the Hanford response to the chemical explosion. Weaknesses were observed in such areas as event classification, rescue and medical treatment of victims, accountability, responders entering plumes or contaminated areas, coordination and interface problems with the landlord (i.e., Kirtland Air Force Base), and a failure to provide victim dose and exposure information to the hospital. At AL's TSD, problems were identified in hazards assessments, quality and use of EALs, and the adequacy of the technical basis for removal of the radiation detectors from convoys used to transport nuclear weapons and materials. The deficiencies at SNL and TSD were not self-identified or reflected in responses to the Secretary's memoranda, indicating a need for AL to be more engaged in critical assessment, management oversight, and review of submittals.

The Rocky Flats Field Office has established excellent working relationships on emergency management with the State of Colorado and local stakeholders.

RFFO and ID have also worked successfully with their contractors to accomplish significant improvements in emergency management over the past year. ID has worked with the new operating contractor to accomplish significant improvements in emergency management and preparedness, including integration of all INEEL subcontractors and facilities under a single emergency management program, improvement of comprehensive hazard assessments and EALs, and establishment of excellent emergency response facilities and equipment. However, ID and EM need to further clarify roles, responsibilities, and authorities and become more involved in management oversight and assessment of program effectiveness. RFFO has also worked with its integrating contractor to accomplish substantial improvements in emergency management and preparedness, including a reduction in site chemical vulnerabilities, development of comprehensive hazards assessments, and establishment of an excellent working relationship on emergency management with the State of Colorado and local stakeholders. Further improvements are warranted in areas such as the Joint Public Information Center, RFFO emergency organization staffing, and documentation and coordination of emergency preparedness information and issues among RFFO, the integrating contractor, and subcontractors.

SANDIA NATIONAL LABORATORIES ANNUAL EXERCISE

Issue: A number of the weaknesses observed during the SNL emergency exercise in April 1998 were similar to the weaknesses revealed in the March 1997 Hanford chemical explosion. This is indicative of a less than effective response and corrective actions to the Secretary's directives and the lessons learned from other DOE sites:

- The initial classification of the emergency, as well as a subsequent classification upgrade, was incorrect.
- Initial responders traversed the simulated toxic chemical plume and did not have personal protective equipment.
- Accountability and search and rescue were not effective in the timely recovery of emergency victims.
- Medical treatment for emergency victims was delayed for several hours.
- Exposure and contamination information did not accompany victims to the hospital, and the hospital did not know who to contact at SNL for information on hazardous material exposures or contaminants.

OR is attempting to implement a "Reservation Emergency Plan" that includes ORNL and the two other OR sites near ORNL—the Y-12 Plant and the East Tennessee Technology Park (formerly K-25). The Plan has significant potential for sharing emergency resources, addressing multiple site issues, and taking advantage of the common emergency operations center established at the East Tennessee Technology Park. Successful implementation of the Reservation Emergency Plan is dependent on DOE Headquarters funding support and overcoming organizational barriers and resistance from the individual sites and contractors. OR needs to be more aggressive in ensuring the prioritization of hazards assessments and EAL development, maintaining OR emergency response organization competency through training or retraining, implementing a policy on emergency procedure use and adherence, and implementing an Oak Ridge Reservation-wide drill and exercise program that meets the intent of DOE Order 151.1.

Under the auspices of OAK, LLNL is making substantial improvements in response to deficiencies identified in emergency management during the 1997 EH integrated safety management evaluation. The program is being redesigned and improved to include important actions, such as changing classification and protective action decision-making roles and responsibilities, improving processes for emergency notifications, and developing improved hazards assessments. Of particular note is the proactive OAK and LLNL decision to integrate the implementation of DOE Order 151.1 emergency management requirements with the implementation of DOE Policy 450.4, Integrated Safety Management Policy. The integration of emergency management and integrated safety management is important in ensuring a DOE-wide structured and effective approach to safely managing emergency response hazards and activities. DP has been supportive of OAK and emergency management upgrades at LLNL. OAK needs to be more aggressive in monitoring contractor emergency management effectiveness and improvements, including upgrades to hazards assessments, procedure use and adherence, and work planning and control.

NV has recognized the need to strengthen the emergency management program at NTS. A structured emergency management program had not, until recently, been established under DOE Order 151.1 or the prior 5500 order. Emergency response was previously incorporated into the individual procedures for nuclear testing, which was discontinued over six years ago. Under new leadership, NV has accomplished a number of improvements, including approval of a Nevada Operations Office Consolidated Emergency Management Plan, approval of hazards assessments for the U1a complex and the new Device Assembly Facility, and establishing the NV Site Operations Division and NTS Emergency Management Center. NV needs to further clarify roles and responsibilities and resolve coordination and interface issues on emergency management between the operating contractor and the two national laboratories conducting activities onsite. Most of all, NV needs to overcome organizational resistance to change and to test its integrated emergency response capabilities in a full participation emergency exercise that includes such essential elements as consequence assessment, field monitoring, worker rescue and medical treatment, interface with state and local authorities, and public information.

While there are examples of strong DOE operations office performance and a significant number of important initiatives are under way or planned, DOE as a whole has a long way to go to establish fully effective emergency management programs across the DOE complex. The continuing weaknesses at many sites indicate an inability or reluctance to learn from mistakes, an organizational resistance to lessons learned from other sites, and a less-than-realistic understanding of actual emergency management performance and capabilities on the part of some operations offices and their contractors.

Most operations offices need to be more effective in monitoring contractor performance, maintaining the qualification of their own staff, implementing effective processes for review of contractor submittals, and ensuring accountability for emergency management performance.

The "partnership" between DOE Headquarters and operations offices, referenced in DOE Order 151.1, is not working effectively to address generic issues and achieve continuous improvement. Each operations office appears to be working in isolation to resolve issues and

overcome challenges and barriers. This fragmented approach results in unnecessary and significant variation in emergency management and response performance and capabilities. The operations offices need to cooperate to resolve generic performance issues, share lessons learned, benchmark against noteworthy practices, and maintain a consistent level of emergency preparedness across the complex. Most operations offices need to be more aggressive and effective in monitoring contractor emergency management performance, maintaining the training and qualification of their own emergency response organization members, and establishing and implementing processes for timely and effective review of contractor emergency management submittals. Finally, the operations offices need to achieve accountability for emergency management performance through more explicit and quantifiable contract language and performance metrics and by linking emergency management roles and responsibilities to annual appraisals.

Assessment of Status and Progress: Contractors

In some cases, DOE contractors have established an overall strong emergency management program or have made significant recent improvements. Specific noteworthy practices and positive attributes are included in Volume 2.

The Savannah River Site contractor has been effective in ensuring that personnel are proficient at their duties, and that problems are identified and brought to management attention for a timely resolution.

Although there are specific areas in need of improvement, WSRC has established a generally effective emergency management program at SRS. Much of the success of the SRS program is attributed to management's commitment to establishing a comprehensive training and drill program and an aggressive self-assessment program. These programs have been effective in ensuring that personnel understand and are proficient at their duties, and that problems are identified and brought to management attention for a timely resolution.

Since assuming the role as integrating contractor for INEEL three years ago, LMITCO has significantly improved its emergency management program. The numerous facilities have been brought together under a single emergency management program, emergency response facilities and equipment are excellent, and there are sufficient numbers of qualified personnel to respond to emergencies at all times. In addition, the INEEL hazards assessments are comprehensive and current, and consider malevolent acts. INEEL has also developed EALs that provide for the timely classification and notification of events and protective actions.

The Hanford contractor has used an effective project management approach to make substantial progress toward resolving deficiencies and improving performance in exercises and actual events.

The Hanford contractor, Fluor Daniel, has made substantial progress toward resolving the deficiencies revealed during the response to the chemical explosion in 1997. A well-managed project approach was employed to effectively coordinate and integrate the upgrade efforts of the management and integrating contractor, the environmental health contractor, facility operating contractors, the operations office, and stakeholders. The project approach was successful in achieving substantial improvements in a short time.

A fire-fighting crew

Improved command and control, protective actions for site personnel and responders, coordination and communication between site organizations, and offsite medical treatment for simulated victims were all evident during the June exercise. Additional improvements are still needed in the coordination and interface between the DOE and contractor emergency response organizations (including the Emergency Manager and Emergency Director), classification and clarification of upgrades of events, and the dissemination of public information.

The LANL hazardous materials response team is competent, well trained, and equipped to respond to radiological and chemical emergencies on or off site. LANL medical support is effectively integrated into sitewide emergency preparedness, planning, and response activities. The occupational medical program actively participates in emergency drills, annual exercises and scenario development, and has effectively utilized hazards surveys/assessments to plan for the mitigation of health effects from site emergencies.

While LANL has accomplished needed improvements in emergency management and response capabilities, there were several remaining weaknesses. Hazards assessments need to be strengthened, particularly in the control of chemical hazards and vulnerabilities and the identification of hazards associated with classified "work for others." Emergency response organization procedures and training need to be improved, and backshift duty arrangements need to be evaluated to ensure the capability to classify emergencies and notify stakeholders in a timely manner.

LLNL, in response to weaknesses identified during the 1997 Oversight safety management evaluation, has initiated numerous improvements in emergency management. LLNL has already linked improvements in emergency management to their implementation of integrated safety management. Although in its early stages, LLNL has already demonstrated that integrated safety management can be an effective tool for ensuring that emergency management program weaknesses are corrected and that corrective actions are effectively integrated into site operations.

Despite these positive findings, significant weaknesses remain in emergency management and preparedness across the complex. Of most concern is that many of these weaknesses, apparent at more than one site, are the same as or similar to those identified over a year ago during the Hanford chemical explosion. The continuing problems indicate an inability to identify, disseminate, and act on lessons learned. In addition, the sites' responses to the Secretary's memoranda are often over-optimistic and some are of questionable validity. The identified weaknesses, such as those in event classification and competency, indicate that the problems encountered in emergency response at Hanford could still occur today across the complex.

Weaknesses in assessments and lessons learned programs contribute to continuing weaknesses at many DOE sites.

A number of factors contribute to these continuing weaknesses and hinder DOE's ability to share lessons learned. Although some interactions are occurring, the various sites generally do not share lessons learned, and they tend to develop program elements without taking advantage of similar ongoing or complete efforts at other sites. Many contractor managers also are reluctant to devote resources and attention to preparing for low-frequency, high-consequence events. The generally ineffective assessment and feedback methods and contract performance measures also contribute to managers not having a realistic picture of contractor performance and corresponding failures to take corrective action.

The following paragraphs provide an overview of generic weaknesses in contractor implementation of emergency management programs at DOE sites. Appendix A provides additional details on these generic weaknesses (as well as generic weaknesses in the DOE order and interfaces with stakeholders) and includes opportunities for improvement and examples of good performance noted at DOE sites that can be used for benchmarking.

Hazards Assessments and Protective Actions. Most sites had deficiencies in development and quality of hazards assessments, EAL procedures, and consequence assessments. These elements are vital to timely and effective event classification and protective actions for workers and the public. Hazards assessments are required for facilities with the potential for a hazardous release and form the basis for the development of EALs, emergency procedures, and protective actions. Despite the Secretary's mandate to ensure that all hazards assessments be

updated by March 31, 1998, hazards assessments at several sites had not been developed, were not reflective of current hazards, or did not have adequate technical basis. Several sites, including LLNL, ORNL, SNL, and TSD, had not placed priority on the development of hazards assessments and had not completed them as required. Problems were also identified in the implementation and use of event consequence assessments, which are essential to protective actions. For example, there were instances of misinterpretation of field data, incorrect assumptions, non-conservative protective action tables, failure to identify radioactive releases, and poor communication of dose models and inputs to decision-makers. Conversely, INEEL, SRS, RFETS, and Hanford have developed and maintained comprehensive hazards assessments. Unlike most other sites, INEEL considered malevolent acts in their hazards assessments.

Event Classification and Emergency Action Levels. Timely and conservative classification of events is essential to notification, response of external organizations, and protective actions. Classification was the subject of much of the Secretary's memoranda, and NN-60 conducted training sessions across the complex on emergency classification and evaluated EALs, which are the mechanisms used to classify events. Despite these efforts, sites continue to have weaknesses in procedures, training, drills, and the competencies of initial responders to support the timely and conservative classification of events and associated notifications and protective actions. Problems with timely and conservative classification were evident in emergency exercises at Hanford, SRS, and SNL. Tabletop drills at other DOE sites indicated that initial responders did not have a clear understanding of the order requirements and emergency management guide provisions relating to prompt classification and sometimes could not classify events in a timely manner. Since DOE Order 151.1 links the 15-minute notification requirement to the time of classification, delays in classification can significantly delay important notifications.

Worker Safety and Treatment. Continuing challenges to worker safety during emergencies, similar to those at the Hanford explosion, were evident at several sites. In the recent SNL emergency exercise, severely injured or contaminated workers were not accounted for, rescued, or properly medically treated for several hours after the release of toxic chemicals. Initial responders were dispatched and a security checkpoint was established within the highest concentration of the chemical plume. Decontamination methods used for severely injured workers (e.g., the use of a fire hose) could have caused even more serious injuries. Personal protective equipment was not provided to personnel who were involved with decontamination activities, thus creating the potential for spreading contamination. Toxic chemical exposure and radiological contamination information did not accompany injured personnel from the triage area to local hospitals. Without such information, patient care can be compromised and contamination can be spread within the hospital. Similar weaknesses were noted at a number of DOE sites in areas that can affect worker safety, such as excessive delays in personnel accountability, delayed search and rescue, failure to clearly designate contaminated areas, inadequate hazards assessments and hazardous material and exposure information, and inadequate medical treatment of exposed personnel. Corrective actions have not been sufficient to ensure the safety and effective medical treatment of site workers.

Training, Competencies, and Proficiency. Maintaining a high level of competence and proficiency at all levels of the contractor emergency response organizations is essential to effective emergency management and the ability to mitigate events. Maintaining competence and proficiency, however, can be a significant challenge given the large size of many emergency response organizations and the limited opportunity to practice the significantly different roles, responsibilities, authorities, and organizational alignments associated with emergency response. This challenge is being exacerbated by contractor downsizing, decreases in funding, and reductions in emergency management training, drills, and exercises.

SRS has established one of the most comprehensive drill and exercise programs within DOE and has integrated facility casualty drills into the sitewide emergency management program. Even SRS, however, is encountering difficulty in ensuring annual training and participation in exercises, particularly for upper-tier managers. Some deficiencies in competence were evident during the SRS emergency management exercise in such areas as timely and conservative classification, consequence assessment, public information, control of field teams, and use of new electronic status boards.

Significant deficiencies in competence and proficiency were evident in exercises and drills at several sites.

The deficiences in emergency response organization competence and proficiency observed through exercises or tabletop drills at other sites were more significant. At NTS, individuals responsible for initial event classification had not been trained and did not have a clear understanding of their assignments for performing this critical function. Weaknesses in conducting consequence assessments were identified at several sites, including NTS, SNL, and SRS. These deficiencies were evident in various areas, including protective actions, medical treatment of workers, response to transportation events, coordination and control of monitoring teams, radiological protection and contamination control, and public information. Contractor emergency response organizations need to be strengthened by greater participation in drills, more management support for training, and better management guidance on timely and conservative event classification, notification, and protective actions. Sites need to continue to expedite development of emergency management qualification standards, lesson plans, training policies, and a structured drill and exercise program.

Performance Feedback Mechanisms. Structured assessments and critiques are essential to ensuring the sustained ability to effectively respond to and mitigate emergencies. Most contractor assessment programs lacked structure, specificity, evaluation criteria, critical evaluation against DOE requirements and expectations, or benchmarking against effective programs. The programmatic assessments performed by the operations offices and contractors were not sufficient to identify existing weaknesses such as those identified in hazards assessments and EALs. A notable exception was WSRC, which had established stringent quantifiable assessment criteria, conducted periodic assessments, and performed independent evaluation of drills and exercises.

There is a significant reluctance to assign failing grades on exercises.

One of the key deficiencies in feedback on emergency management is an absence of critical and realistic critiques and evaluations of emergency drills and exercises. Critiques are often informal, unstructured, and conducted in a large group format without documentation. When weaknesses are identified, followup has not been consistent. There is a significant reluctance among DOE contractors to assign failing grades to exercises or specific elements of exercises, and to require corrective actions and retesting of the failed exercise element.

An evaluation of the Bechtel Nevada emergency management program in preparation for operation of the new Device Assembly Facility contained a core requirement that a status review be conducted to assure that DOE Order 151.1 requirements were implemented. The review identified numerous weaknesses in emergency preparedness procedures, audits, assessments, exercises, and drills. Neither the implementation plan for DOE Order 151.1 nor a followup compliance assessment was completed, and numerous deficiencies were evident in the March 1997 emergency drill. These included delayed on-scene response resulting from consequence assessment information being unavailable, inaccurate reporting of personnel accountability, deficient radiation worker training, procedures and checklists that had not been finalized and approved, and deficient radiological control procedures. The rationale for determining that criteria were met was based on corrective actions that were not completed and verified, and that were not scheduled to be completed until after the facility was operational.

In some cases, identified deficiencies have not been corrected in a timely manner.

The weak contractor emergency management assessment and critique processes, low performance expectations, and absence of benchmarking have contributed to an unrealistic sense of confidence in emergency management programs. This overconfidence is reflected in some of the optimistic responses to the Secretary's memorandum, the failure to self-identify and correct weaknesses, and a missed opportunity to capitalize on the lessons learned from the Hanford event. In addition, contractor response to known weaknesses and deficiencies has not always been effective.

At SNL, for instance, deficiencies identified in personnel accountability, delayed personnel rescue, failure to control contaminated areas, inadequate medical followup for injured or exposed personnel, and inadequate hazards assessments had all been previously identified by DOE and SNL over the last few years but not effectively resolved.

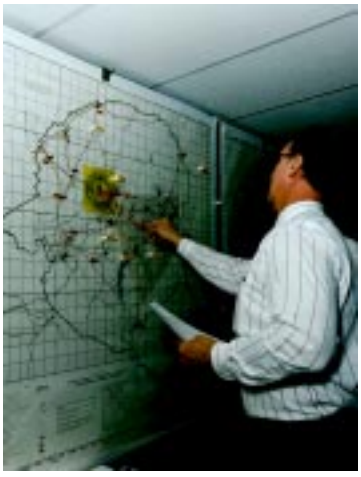
Interfaces with Stakeholders

DOE has a fundamental responsibility to effectively protect the public in the event of an operational emergency. This responsibility is shared with a wide range of external organizations and stakeholders. Among these stakeholders are other Federal agencies; tribal, state, county, and local governments; multiple emergency management and regulatory agencies; law enforcement agencies; citizen organizations; and hospitals. Each of these relationships must be individually and collectively fostered in a comprehensive program of planning, preparedness, and response to establish and sustain an effective working partnership.

The details of the partnership with stakeholders must be interwoven with virtually every element of emergency management planning, preparedness, and response. Hazards assessment results must be shared to ensure mutual understanding of the basis for protective action recommendations and to coordinate the boundaries of emergency management planning zones. Onsite and offsite emergency plans and procedures must be coordinated to eliminate conflicts, ensure agreement on notification protocols and messages, and establish agreement and understanding with regard to critical decision-making. Offsite organizations need training to ensure that they are well informed about facilities, hazards, and methods for response and interface with the site. Offsite medical responders must be trained, must participate in site drills, and must be equipped to deal with the range of potential hazards at the sites. Dose assessment and field monitoring programs require coordination to facilitate effective field monitoring (including jurisdictions) and understanding of consequence assessment results (which can vary in their methods and units). Public Notification Systems (PNS) require significant coordination to ensure adequate coverage for permanent and transient populations within the emergency planning zones, interface with emergency broadcast systems, and agreement on criteria for activating PNS. Emergency public information interfaces must be strong to establish and implement joint information centers to coordinate press briefings, news releases, and rumor control. Information provided to the public and news media concerning site hazards and emergency response must be coordinated. Planning for evacuations of site personnel and the public must be coordinated with offsite emergency planning officials and law enforcement agencies. Effective coordination of emergency exercises, drills, and notification tests is needed to ensure offsite participation, workable scheduling, input to exercise objectives and scenarios, and correction actions. Finally, coordination to ensure equitable financial support of offsite response organizations can require significant effort.

Improving working relationships are helping to address stakeholder concerns.

Although concerns were expressed, most of the state emergency management organizations interviewed characterized the overall working relationships with sites as good. A very strong working relationship and systematic approach was noted between RFFO, RFETS, the state of Colorado, and local stakeholders on emergency management issues at RFETS. In light of the historical tension between RFETS and the state, the good working relationships are a notable achievement that can serve as a model for other sites. Other notable examples of cooperation were seen at various sites, such as the hazardous



Emergency Planning Zones

material response support provided by LANL and LLNL within their communities, and the improved working relationships between LLNL and state agencies.

The stakeholders interviewed generally indicated that relationships were improving and that DOE was becoming more open in providing information. However, stakeholders expressed concerns with DOE's performance in a number of areas, including some that were highlighted in the Secretary's memoranda in August 1997. These include:

- Providing information and data on events and releases without delay
- Prompt and conservative classification of events
- Notification criteria for operational emergencies that do not require further classification according to DOE orders but that that have the potential for being classified as an emergency
- Completing hazards assessments to provide a foundation for the development of comprehensive protective action recommendations
- Improving incident command and control through knowledge and application of the incident command system
- Effective integration of field monitoring teams and data
- Enhancing emergency management system interfaces and DOE requirements for transportation of hazardous materials
- Improving coordination on the joint release of emergency information to the public.

Other stakeholders indicated their impression that DOE has a lingering tendency to use secrecy as a barrier to sharing information in planning and during an event. Still others expressed site-specific concerns with the planned reduction of emergency planning zones, the lack of consideration of malevolent acts in hazards assessments, and the release of hazardous materials to surface water (which does not necessarily trigger prompt emergency notification according to DOE requirements and guidance but could impact downstream public water supplies). Some state emergency management agencies expressed concern about the need for significant management attention at specific sites to ensure effective management of an operational emergency. Many state and local emergency management agencies expressed concern with the trend toward reducing internal DOE overhead funding in light of program weaknesses and the risks associated with changing site missions. In addition, some sites expressed concern that decreasing the level of DOE funding could jeopardize state and local EOCs and the ability to respond to emergencies.

Interfaces with local hospitals must be integrated with emergency plans, including providing hospitals with up-to-date information on site hazards, points of contact, and phone numbers. Opportunities to share training courses, perform joint training, and evaluate equipment and supply needs are also important communication links that must be maintained. These interfaces were effective at some sites. However, at several sites, outdated MOUs indicated that formal communication had not occurred for extended periods of time. In some cases, local medical facilities were included in the exercise program, but the exercises were not effective in providing feedback (e.g., activities were not evaluated).

Weaknesses are evident at many sites in providing timely and accurate emergency-related information to the public.

The success or weaknesses of the Department's stakeholder interfaces are most evident to the public in joint information center operations. As demonstrated by recent exercises

An Emergency Response Team rescuing "victims" at a simulated accident

and events, there are still weaknesses at many sites in providing timely and accurate emergency-related information to the public, which can contribute to rumors, impede timely and effective protective actions, and undermine DOE credibility. The joint information center staff at a number of sites do not routinely participate in drills and exercises to maintain their competence and proficiency.

At the individual sites, stakeholder relationships are dynamic and subject to many influences directly and indirectly related to emergency management programs. Formal arrangements, such as memoranda of agreement, mutual aid agreements, and relationships with vendor hospitals, have been established at most sites; however, these arrangements are not adequately reviewed and revised and encompassed within a structured system that ensures they are updated and modified as needed. The organizations and individuals with responsibility for these agreements are often not clearly identified and held accountable.

Generic Weakness #6 in Appendix A provides additional details on the problems with stakeholder interfaces, including problems with joint information centers, formal agreements, and coordination among agencies.

5.0 Opportunities for Improvement in DOE Headquarters Program Management

While specific opportunities for improvement are included with each generic weakness (see Appendix A), the following opportunities for improvement represent a corporate approach to improving DOE emergency management programs. The opportunities for improvement in this section focus on addressing longstanding problems at DOE Headquarters (such as inconsistent leadership and overlapping responsibilities) that are hindering DOE-wide efforts to address emergency management weaknesses and ensure continuous improvement.

1. Establish a central point of leadership.

With multiple program offices, sites, and facilities and a wide range of activities, hazards, and facility life cycles, DOE needs a central point of line management leadership for emergency management and preparedness. A central point of leadership can effectively coordinate the efforts of program offices, operations offices, and NN-60 to achieve results that can not be readily accomplished with the currently fragmented approach to directing and managing emergency management programs. Such an organization would promote clear accountability for performance and common criteria for performance evaluation. Specific activities that can be performed under the auspices of a central point of leadership and the potential benefits that can result include:

- As contracts are renewed or operating contractors change, incorporate contract provisions and performance measures into contracts to achieve accountability for emergency management programs.

- Expedite the full implementation of DOE Order 151.1, including completion of essential elements such as hazards assessments and EALs.

- Establish and implement processes in each operations office for the timely and effective review of contractor emergency management performance and submittals, including exercise evaluations, Emergency Readiness Assurance Plans, DOE Order 151.1 implementation plans, hazards assessments, and EALs.

- Coordinate with NN-60 to establish a consistent process and set of criteria for evaluation and grading of emergency exercises, including cross-evaluation between sites (e.g., using experienced evaluators from other sites and operations offices to provide an objective evaluation of performance).

- Ensure that evaluators have clear and enforceable authority to assign failing grades to exercises, or elements of exercises, and that management is required to improve and reevaluate performance within a specified time period (e.g., 90 days).

- Establish a corporate DOE approach to resolving generic weaknesses and issues in emergency management rather than having each individual site and contractor continue to attempt to solve problems.

- Strengthen sharing and acceptance of lessons learned in emergency management, such as for the Hanford chemical explosion, across the DOE complex.

- Improve the use of benchmarking among sites and emergency management programs to promote improvement and learning from noteworthy emergency management program elements.

- From a DOE-wide perspective, ensure that direct and overhead funding and resources allocated to emergency management programs are balanced and reasonable. Specific areas to focus on include: ensuring that resources are adequate and effectively coordinated in instances where sites/facilities receive support and direction from multiple program offices to sites and facilities; evaluating the impact of proposed reductions; and reviewing the prioritization basis for support of emergency program and response upgrades.

- Establish an effective DOE-wide process for monitoring agreements and coordination with state and local governments, mutual aid organizations, and stakeholders for emergency management programs.

- Work toward a common complex-wide terminology for key emergency response organization positions and facilities to reduce confusion, facilitate Headquarters participation in exercises and actual emergencies, and improve coordination and communication with stakeholders.

2. Clarify DOE Headquarters roles, responsibilities, authority, and accountability.

The roles, responsibilities, and authorities for the support of and participation by DOE Headquarters need to be clarified and strengthened, both in terms of the Headquarters roles during emergency management exercises and actual emergencies and in terms of Headquarters line management and program support. Specific opportunities for improvement include:

- Consider restructuring the Headquarters emergency response organization, including the Executive Team, program offices, NN-60, and Technical Team to clearly communicate roles and expectations within Headquarers and between Headquarters and the field.

- Ensure continuing competency of the Headquarters emergency response organization, including the Executive Team, through required training, retraining, and increased participation in drills and annual emergency exercises.

- Strengthen the public information element of emergency response by clarifying Headquarters roles, improving the coordination and approval process for press releases at DOE Headquarters and the field, and strengthening the interface between the Office of Public Affairs and NN-60.

- Evaluate the impact of proposed reductions in funding and resources, directly or indirectly supporting emergency management and preparedness, including proposed upgrades to emergency programs, procedures, and equipment; full implementation of DOE Order 151.1, Comprehensive Emergency Management; and support provided to state and local emergency operations centers and response capabilities.

- Within each of the line programs, clearly define the organizational and individual roles, responsibilities, and accountability mechanisms for emergency management program effectiveness. Specific areas that warrant attention are:

    - Ensure that all appropriate personnel have a good general understanding of the emergency management system program elements required by DOE Order 151.1 and the technical basis for important elements (e.g., basic knowledge of atmospheric dispersion analyses needed to understand consequence assessments and make decisions about protective actions).

    - Establish management responsibility and authority for interfaces on policy, directives, and guidance development and interpretation with other line programs and NN-60 to establish consistent performance expectations and provide for the timely comment, review, and implementation of agreements. Also establish a process,

including clear responsibilities and authority, for timely dispute resolution when issues cannot be readily resolved.

- Ensure that program office personnel understand that their role is to provide support to the site during actual emergencies, exercises, or drills.

- Establish requirements and criteria for maintaining proficiency for assigned management and technical personnel. Provide for site-specific performance-based training, drills, and exercises to ensure proficiency.

- Establish roles, responsibilities, and specific mechanisms for interface with NN-60 regarding the review and approval of site Emergency Readiness Assurance Plans in support of long-term funding, prioritization of efforts, and schedules for improvement activities.

- Establish roles, responsibilities, and specific mechanisms for interface between line programs, NN-60, and EH regarding the review and approval of program office or site-specific requests for exemptions from applicable DOE requirements.

- Provide for organizational and individual accountability through specific performance evaluation criteria that encompass all applicable roles and responsibilities.

- Ensure that the Office of Oversight and NN-60 coordinate their efforts under the partnership provision of DOE Order 151.1 to perform more frequent evaluations of emergency management programs and exercises, benchmark and disseminate lessons learned and noteworthy practices, provide technical assistance for corrective actions and continuous improvement (NN-60), and identify opportunities for improvement in both policy and implementation (EH).

3. Overlay the implementation of DOE Order 151.1 and DOE Order 450.4 to ensure that the principles and core functions of integrated safety management are also applied to emergency management programs.

DOE needs to adopt a systematic and comprehensive approach for improvement and ensure that line management at every level of the organization recognizes that emergency management is an integral part of site operations. The DOE integrated safety management initiative provides a good framework for such a systematic and comprehensive approach. Emergency management faces many of the same difficulties (e.g., ensuring clear roles and responsibilities) as safety management. As the DOE-wide approach for improving safety, integrated safety management is also a logical and effective framework for improving emergency management.

APPENDIX A

Generic Weaknesses and Opportunities for Improvement

Generic Weakness #1: Hazards Assessments and Protective Actions

Hazards assessments, emergency action levels, and protective actions do not, in some cases, support effective emergency response by ensuring timely and conservative classification, protective actions, and mitigation.

Emergency preparedness hazards assessments are required for facilities with the potential for a radiological or chemical release, and the need for these assessments is determined through hazards surveys. These hazards assessments are vital components of emergency preparedness and form the basis for the development of all elements of the emergency management program, including EALs and protective actions for workers and the public. The EALs provide the guidance for timely, accurate, and conservative classification of events. Emergency plan implementing procedures, derived from hazards assessments, provide the necessary guidance for the response to and mitigation of emergencies, including dose assessment, immediate actions, notifications, and protective actions.

In August 1997, the Secretary's Office, in response to deficiencies identified in classification during the response to the Hanford chemical explosion, directed the following:

- "Site/facility manager must ensure that EALs are complete and/or updated for all facilities by March 31, 1998. The EALs should cover the full range of accident scenarios addressed in the hazard assessment as well as allow for discretionary, subjective event classification to address situations not specifically addressed in the hazard assessments."
- "Site/facility managers must ensure that all hazard assessments for emergency management preparedness are complete and/or updated by March 31, 1998."
- "The Office of Emergency Management will conduct an immediate review of emergency action levels and associated event categorization criteria at all the Department's facilities with the potential for significant offsite consequences from radiological and non-radiological hazardous materials." (within 30 days of the August 27, 1997, memorandum)

This Office of Oversight evaluation determined that hazards assessments are still a significant weakness at many DOE sites and facilities (see "Benchmarking" below for exceptions). In several instances, hazards assessments have not been completed or updated to ensure that current and specific facility hazards are identified and mitigated. At ORNL, development of hazards assessments for facilities other than the test reactor had not been considered a priority. At other sites, such as LLNL, much work remains to be completed, and the Secretary's deadline was not met. Currently, generic hazards assessments, taken from the authorization basis documentation, are being used at many facilities; however, the authorization basis documents do not ensure that facility-specific hazards are identified and mitigated. Other sites or operations that have not yet established or updated hazards assessments include LLNL, SNL, and TSD. Other typical deficiencies observed in hazards assessments include inadequate technical basis, failure to consider all accidents or malevolent acts, failure to consider hazards from co-located facilities or "work for others," and a lack of work planning and control procedures to ensure that hazards assessments are maintained current to reflect changing facility and site conditions and hazards.

Significant weaknesses were still evident in EALs at some sites. The continuing EAL weaknesses are partially attributable to inadequate hazards assessments that form the technical basis. EALs were not developed, were technically inadequate, or were outdated at several sites, including ORNL, TSD, NTS, and SNL. In addition, even when EALs were developed and current, some did not include preplanned actions, consider the full spectrum of accidents, consider discretionary classification, and consider human factors and field validation to ensure ease of understanding and usability. Weaknesses in EALs

can hinder timely recognition and notification of events, as well as event classification, protective action, and mitigation. There was also a tendency to rely on experience rather than EALs in some situations. Failure to use EALs often leads to mistakes in classification and protective actions during tabletop drills and emergency exercises.

A number of DOE sites and facilities, such as NTS, ORNL, and TSD, have not yet developed a significant portion of the emergency preparedness procedures, or are continuing to use draft procedures for long periods without finalizing them. In many cases, the quality of emergency procedures is relatively poor, as evidenced by inadequate precautions and limitations, improper use of notes and cautions, multiple actions contained in a single step or note, and immediate actions buried as far back as 13 pages in an emergency procedure. There were many examples of technical deficiencies, including reference to equipment no longer in service, failure to address current emergency response actions, unusable or incorrect tables on acceptance criteria, and non-conservative directions that do not meet DOE requirements or policy. These deficiencies are indicative of inadequate field validation, failure to consider human factors, an absence of management review and control, and an absence of processes to monitor quality control. As with EALs, there was also a noticeable reluctance at some sites to use and adhere to emergency procedures and to rely instead on experience when responding to emergencies. Although this reluctance may stem in part from poor procedure quality and a lack of confidence in them, procedural non-compliance under the stress of an emergency can compound the potential for human error and result in an accident becoming more severe because of unexpected and unanalyzed actions.

Specific weaknesses identified in emergency hazards assessments, EALs, and procedures include:

- ORNL chemical hazards assessments are based on preliminary hazard screens and do not reflect current chemical inventories.
- EALs are developed for only 16 facilities at SNL; 1,200 facilities need to be screened to determine hazards.
- Hazards assessments have not been developed and/or updated at most ORNL and LLNL facilities, and for some TSD activities.
- Many EAL sets do not yet consider non-facility transportation accidents.
- Many hazards assessments do not consider malevolent acts.
- Some sites' EALs still do not contain instructions for use of discretionary judgment for situations that are not specifically addressed in the hazards assessments or EALs.
- Effective processes are not in place at several sites, including ORNL, SNL, NTS, LANL, INEEL, RFETS, and TSD, to ensure that hazards assessments and EALs are maintained current to reflect changing hazards, activities, and contractors.
- Emergency implementing procedures are not maintained current and technically accurate at some sites or operations, including TSD, where EALs still referenced the use of radiation detectors a year after these detectors were removed from the transport vehicles.
- Some EALs and emergency procedures use tables or flow diagrams that are less conservative for dose assessment and protective actions than DOE requirements or guidelines.
- EALs and emergency procedures at some sites have not considered human factors to ensure usability, consistent format, and the appropriate use of precautions and limitations, notes, cautions, tables and flow diagrams, and cross-references to other procedures.
- Some hazards assessments have not considered the hazards associated with co-located facilities or hazards to site personnel that can result from nearby sites. Such considerations increase in importance with privatization and leasing of onsite facilities.
- Emergency response organization members at some sites are not adequately trained and proficient in the use of EALs and emergency procedures or significant revisions of these documents to ensure that they can properly classify events and perform consequence assessments.

Opportunities for Improvement

- Prioritize and expedite the development/updating of hazards assessments and EALs.
- Establish effective work control processes for maintaining hazards assessments and EALs current to reflect changing hazards, activities, inventories, and contractors.
- Ensure that hazards assessments and EALs appropriately address natural phenomena, transportation accidents, restoration projects, and malevolent acts.
- Review tables, flowcharts, and operation sites in EALs and emergency procedures to ensure that consequence assessment, classification, and mitigating actions are conservative and adhere to DOE requirements and guidelines.
- Ensure that hazards assessments adequately consider hazards for co-located facilities and the impact of privatization work and leasing in DOE sites.
- Improve the quality, technical accuracy, human factors, and usability of emergency procedures and EALs through detailed writers guides, field validation, periodic reviews and updates, and involvement of procedure users in development and validation.
- Ensure that all emergency responders, including external mutual support members, are adequately trained on EALs and emergency procedures, including major revisions.

Benchmarking

In some cases, specific sites have established and maintained comprehensive and effective hazards assessments, EALs, and emergency implementing procedures:

1. INEEL: The hazards assessments at INEEL were comprehensive and methodically performed. The EALs were identified as a noteworthy practice. The INEEL hazards assessments are particularly effective because they:

- Are updated continually and provide excellent technical basis for EALs
- Specifically consider radiological and toxicological malevolent acts
- Include prescribed attributes, such as facility description, barrier identification, hazard characterization, and hazard screening
- Are prepared for special operations, such as movement of hazardous materials as needed (case-basis hazards assessments)
- Include provisions for routinely updating hazards assessments to reflect changing hazards, inventories, and conditions.

Specific aspects of INEEL EALs that are particularly effective include:

- EAL design that supports timely classification, notification, and implementation of protective actions
- Consistent EAL formats for all INEEL facilities
- Default protective actions provided and tabulated in EALs to facilitate immediate protective actions in advance of consequence assessment
- Strong technical basis of EALs.

2. Savannah River (Westinghouse): The hazards assessments are comprehensive and methodically performed, and they include guidance and requirements from DOE. The SRS hazard assessments:

- Contain facility descriptions, barrier identification, and hazard screening
- Include detailed and complete accident scenarios, including transportation events
- Are comprehensive, mature hazard documents.

3. Rocky Flats: The emergency preparedness hazards assessments are comprehensive and methodically performed, and they provide a good technical basis for other emergency management elements, including the EALs, which are also effective and are updated as needed. Effective aspects include:

- Prescribed threshold planning qualities were used to identify chemical hazards requiring assessment.

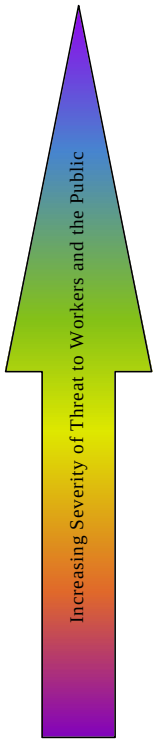
- The hazards assessments were conducted in accordance with site procedures, resulting in uniform, stand-alone documents for each facility.
- A conservative approach was employed so that all buildings containing any amount of radioactive materials were subject to full analysis, and 18 of 30 buildings were identified for priority assessment.
- Beyond-design-basis accidents, such as earthquakes and malevolent acts, are explicitly addressed in hazards assessments.
- Hazards assessments were reviewed jointly by RFFO and the State of Colorado.

Generic Weakness #2: Classification of Events

Timely and conservative classification of events and emergencies is not effectively institutionalized.

Classification of events involves the use of EALs, which are based on the potential severity of the event and the population that could be affected (e.g., only workers at the site, or the general public). According to DOE Order 151.1, Comprehensive Emergency Management System, which was issued in 1995, events must first be categorized. Events representing a significant degradation of safety at a site or facility and requiring a time-urgent response are categorized as Operational Emergencies. DOE Order 151.1 specifies that any Operational Emergency that represents a threat to workers or the potential release of hazardous materials *must* be classified. The Order delineates three classification levels in ascending order of severity: (1) Alert, (2) Site Area Emergency, and (3) General Emergency. Events that are classified at the lowest severity level (i.e., Alerts) require certain offsite notifications to be made and certain actions to be taken at the site. Additional actions need to be taken both on and off site when events are classified at higher levels.

Figure 4 presents the classification levels and definitions.



Events/Conditions Requiring Categorization/Classification		NOTIFICATION	
Categorization	Classification	Maximum allowed time between initial categorization or classification and notification	
Health & safety, environment, security, safeguards, offsite DOE transportation events	Operational emergencies involving a hazardous materials release (radiological or non-radiological)	DOE	State
Operational Emergency	General Emergency	15 min.	15 min.
	Site Area Emergency	15 min.	15 min.
	Alert	15 min.	15 min.
		30 min.	30 min.
Non-Emergency Events			
Unusual Occurrence		2 hours	site-specific
Off-Normal Occurrence		4 hours	site-specific

Figure 4. Emergency Categorization/Classification Concept

Timely initial classification of events is essential to ensuring required notifications, initiating protective actions for workers and the affected public, and ensuring that resources are available to mitigate the emergency. In order to correctly classify events in a timely manner, sites must have effective procedures and EALs, personnel must be trained and proficient, and personnel must have the appropriate authority and management support.

Secretarial concerns about the effectiveness of event classification were indicated in the Secretary's August 27, 1997, memorandum, which states: "Recent occurrences at a number of sites indicate continuing difficulties throughout the DOE complex with respect to both the timeliness of event recognition and notifications. The delays in notifying State and other outside agencies and Headquarters of events…[have] been attributed to: confusion with respect to Departmental notification requirements; attempts to gather detailed information before making initial notification; inadequate emergency event classification procedures; and inadequate training of the individual responsible for event classification." The Secretary directed Headquarters and the field to take specific corrective actions related to event classification. NN-60 was also directed to conduct a special review of EALs and conducted complex-wide training on conservative classification.

Despite the Secretarial directives, additional training, and corrective actions, emergency classification continues to be a significant weakness across DOE. Although varying in degree, weaknesses were observed in classification at every site evaluated. There continues to be an inability on the part of responsible initial decision-makers to classify events until supported by a full staff of advisors or relieved by the Emergency Director. The reluctance to classify an event often reflects concerns about the impact of declaring an emergency, adverse publicity, and the resources that could be expended on responding to an emergency. Although clear authorities to classify events are often specified in site procedures, sites often do not, in practice, adhere to the formal procedures, and the initial decision-makers often do not exercise their authorities.

This weakness in timely classification was particularly pronounced at sites where individuals did not have adequate training and effective tools. Some sites have 24-hour operations centers staffed by trained personnel. Other sites rely on positions that are on site at all times (e.g., a shift superintendent) to make the initial classification. Still other sites have arrangements to contact designated individuals (e.g., via pagers and/or call lists) when an event occurs. Effective training and reliable communications procedures are particularly important at sites that do not have a 24-hour operations center to perform the initial classification.

Delays in classification also result in delays of notifications to DOE and offsite organizations because the order ties the 15-minute notification requirement to the time of classification. Delays in classification can also contribute to delays in protective actions for worker and the public and the mobilization of resources essential to responding to and mitigating the event.

As discussed under Generic Weakness #1, many hazards assessments, which form the basis for the EAL procedures that support event classification, are not complete or do not adequately reflect current risks to workers and/or the public. Without adequate hazards assessments, personnel who must classify events are hindered by a lack of accurate information, and thus may be delayed or may make incorrect classifications. Some of the other specific weaknesses with classification and notification include:

- Procedures and EALs do not always effectively support conservative and timely classification.
    - Some EAL procedures and tables are in draft, are not clear, are not well structured, or lack human-factor considerations that would make them more usable or understandable under potentially stressful emergency conditions.
    - In some cases, the tables and criteria provided for classification and consequence assessment are not conservative, as they are required to be by DOE or industry requirements and guidance.
- Personnel did not have adequate training, drilling, and experience to demonstrate proficiency in classifying events.
    - Some contractor and DOE emergency response organization members who are assigned responsibilities for initial classification have not received adequate training or management guidance, or have

participated in few drills and exercises. At many sites, many individuals have responsibilities for classification, but the number of drills and exercises is not sufficient to ensure that all such individuals have an opportunity to practice. Effective training and practice are essential to attain the level of competence, proficiency, and confidence needed to ensure timely and conservative classification of events and timely notification and protective actions.

  - In some cases, training, drills, and exercises have not been designed as a realistic and challenging test of whether individuals responsible for conservative classification are capable and proficient. For example, drills and exercises rarely were designed to determine whether individuals can or will make conservative classification decisions in the absence of confirmed data or when conditions do not align precisely with EALs. When exercise scenarios were designed to require the Emergency Director to use management discretion and judgment, there was delay and pronounced reluctance to declare a site or general emergency, even when a lower classification would have been non-conservative.

- Policies, responsibilities, and authorities may be difficult to implement.
  - When DOE Order 151.1 was issued, a decision was made to not include a specific time limit on the initial classification of an operational emergency involving hazardous materials. Because the 15-minute notification requirement begins only after classification, a significant delay in classifying an event can delay notification and protective actions. Without a specified time limit, there is a tendency for personnel to inappropriately delay classification for a variety of reasons (e.g., collecting more information, waiting to assemble a full staff of advisors, and waiting for activation of the EOC and turnover to an Emergency Director). The expectation for "prompt" classification has not been explicitly defined in orders or guidance.
  - At sites without 24-hour operation centers, the emergency response duty officers, who are responsible for initial event classification and notification actions, may live an hour or more from the site. Such personnel have historically been reluctant to classify an event while at home or on the way to the site. Typically, they wait until they reach the site and obtain the assistance of support staff and additional information, or until the EOC is activated. In such situations, there can be unnecessary or excessive delays in classification, notification, and protective actions.
  - The interactions between DOE Emergency Managers and contractor Emergency Directors were not consistently effective. In some instances, there were delays or non-conservative decisions involving classification within EOCs by contractor Emergency Directors. In these instances, the DOE emergency response organization personnel, including Emergency Managers, did not intercede or provide advice in accordance with their emergency oversight responsibilities. In one exercise, a contractor Emergency Director's repeated requests to upgrade to a site area emergency were denied by the DOE Emergency Manager. In this instance, the DOE Emergency Manager inappropriately overrode the authority of the Emergency Director who was performing according to site procedures. The Emergency Director's decision to upgrade was conservative and appropriate.

Opportunities for Improvement

1. Ensure that all emergency response organization personnel, including initial decision-makers, receive adequate training, retraining, and management direction on timely and conservative classification, and that proficiency is demonstrated and improved through more frequent participation in drills and exercises. Increased performance-based training and

participation in drills and exercises will require line management support. In some instances, it may be more effective and efficient to reduce the size of existing emergency response organizations.

2. Consider modifying DOE Order 151.1 to place a clear, reasonable time constraint on the initial classification of emergencies (e.g., 15 minutes).
3. Complete hazards assessments and EALs (see Generic Weakness #1) to support prompt and conservative classification. These documents need to be thoroughly reviewed to ensure that they are technically accurate and easy to use, reflect current risks and conditions, ensure conservative classification, and comply with applicable DOE and industry hazard guidelines. The documents also need to include more guidance on the classification of events and conditions not covered explicitly by the EALs.
4. Assess the costs and benefits of establishing 24-hour onsite emergency decision-making authority at sites that do not currently have one. Consider the costs and benefits of establishing a 24-hour emergency response facility. Such 24-hour capabilities have many advantages, including prompt response to routine operational events and accidents; more timely initial classification, notifications, and protective actions; better coordination and direction to onsite and offsite response organizations; and initial response emergency managers who have more comprehensive experience and proficiency. Decisions about the need for a 24-hour coverage and capability should be based on hazards assessments and the scenarios that can occur during backshift operations (nights, weekends, holidays). Even at facilities at which activities are not routinely conducted during backshifts, the risks associated with natural disasters and proximity to the public should be considered.
5. At sites that do not have 24-hour decision-making authority on site, ensure that appropriate personnel (e.g., the incident commanders or other appropriate first responders) have clear authority to classify an event and do not have to wait until the EOC is fully staffed. Such authority should be unambiguous and clearly communicated throughout the organization.

Benchmarking

While most sites still demonstrate some weaknesses in timely and conservative classification of emergencies, specific positive attributes related to classification were noted:

- RFETS: The EALs used for classification are comprehensive, have good technical bases, and contain default protective actions (which can facilitate conservative protective actions for workers and the public that can be used until a consequence assessment can be completed during an emergency response).
- INEEL: Facility EALs are designed to support timely and conservative classification. The EALs are prepared according to a consistent format, consider malevolent acts, and include default protective actions.

Generic Weakness #3: Worker Protection During Accidents and Emergencies

DOE sites have not placed sufficient emphasis on protecting and treating workers who could be affected by accidents at DOE sites. Systems for hazards and risk assessments, work planning and control, consequence assessment, search and rescue, protective actions, and medical treatment do not adequately address workers.

With the end of the Cold War, many DOE reactors and production facilities are shut down permanently, and DOE's mission increasingly involves decontamination, decommissioning, environmental cleanup, and restoration of facilities and sites. For the most part, the shutdown of the reactors and production facilities reduces the potential for an accident that could affect the general public. At the same time, however, the

risks and hazards for workers involved in decommissioning and cleanup are changing and increasing. For example, to clean up DOE sites, workers must perform potentially hazardous activities, such as demolition, in facilities where the hazards are not always well characterized. Further, DOE is losing many experienced personnel, and its workforce is often performing new and unfamiliar activities as the nature of work at DOE sites changes.

DOE requirements related to safety analyses (i.e., DOE Order 430.1) recognize the need for increased emphasis on worker protection in safety analysis reports and other authorization basis documentation. However, DOE emergency management program requirements and orders do not reflect the shift in risks associated with DOE's changing missions, work activities, hazards, and workforce. Worker safety has not yet been captured in documentation and procedures essential to emergency management and preparedness, such as hazards assessments, emergency procedures, EALs, and the prioritization matrices utilized by some sites.

During the response to the Hanford chemical explosion in May 1997, workers were directed to traverse the chemical plume without personal protective equipment and during a period when "sheltering" was in effect. In addition, offsite medical treatment for these workers, who displayed symptoms of exposure to toxic chemicals, was needlessly delayed nearly four hours; because of ineffective coordination between the security personnel and facility managers, the security department instructed the workers to remain at the facility rather than go to the hospital. In addition, the hospital was not provided with essential information on the potential effects of the chemical involved. The Secretary's direction included several provisions that directly relate to worker safety (including both the personnel who could be directly affected by an accident and the workers involved in the response to emergencies) in three areas: protective equipment and staffing, protective treatment of personnel, and hazards information.

Most sites that were evaluated have done a commendable job of establishing and maintaining the equipment essential for emergency response, including personal protective equipment. In addition, most sites, including SRS, LANL, and INEEL, have established well-equipped and competent emergency response teams.

Despite these positive attributes, however, some aspects of worker protection and treatment during emergencies continue to be deficient at most sites. During exercises, weaknesses in protecting and treating workers were evident, some of which were similar to problems noted at Hanford:

- Severely injured personnel were not rescued and treated for more than three hours after the chemical spill at Hanford.
- Injured victims who had been evacuated were left unattended.
- Incorrect assumptions and a lack of understanding of the plume dispersion model delayed medical attention to and treatment of exposed workers.
- The decontamination methods used for seriously injured personnel (e.g., decontaminating personnel with a fire hose before they were stabilized) could have resulted in additional injuries.
- Initial emergency responders traversed the toxic chemical plume at a time when it was near its highest concentration.
- A staging area and security checkpoint was established downwind of the spill site and in the path of the plume without determining whether the release had stopped.
- Contaminated, potentially contaminated, and uncontaminated areas were not identified to segregate and control personnel movement.
- Timely and full accountability for personnel was not accomplished during reconnaissance entries, including identifying numbers of injured, potentially exposed, or deceased victims.
- Victims and entry team personnel approaching the decontamination and monitoring areas were not given clear direction to ensure safety and prevent cross-contamination.
- Victim exposure and contamination information did not accompany victims to the local hospitals, and hospital emergency response was not evaluated.
- Personal protective equipment was not specific for individuals performing decontamination tasks.
- The rescue of severely injured victims and accountability for personnel was delayed for up to three hours because of unwarranted concern about radiological contamination from depleted uranium and a hydrogen sulfite plume that had already dissipated.

- Evacuees were required to walk through a simulated 5 rem/hour radiation field to get to the evacuation buses.
- The release and dispersion of iodine were not identified in a timely manner. Early assumptions by consequence assessors that iodine releases were negligible were proven to be erroneous, but only in the later stages of the exercise.

Deficiencies in the protection and treatment of site workers were also observed at other sites. Accountability for site workers, which is essential to search and rescue and prompt medical treatment, was deficient at several sites. In some cases, accountability for personnel took three to four hours. The removal of a time limit for achieving accountability for DOE Order 151.1 (issued in 1995), and less stringent security and access requirements, could impact DOE sites' ability to account for personnel in a timely manner. These accidents and exercises highlight the need to place more emphasis on the protection and safety of site workers during an emergency response.

Opportunities for Improvement

1. Ensure that hazards assessments, procedures, EALs, and prioritization processes adequately consider the safety and protection of site workers, including new or unique risks and hazards associated with decontamination, decommissioning, and environmental restoration.
2. Ensure that all site emergency response activities, including search and rescue, mitigating response activities, field monitoring, and reentry work, are appropriately planned and controlled (including application of the five core functions of integrated safety management).
3. Strengthen the ability to perform accurate and timely consequence assessment, including use of exposure tables, plume modeling, and interpretation and communication of field data, to support effective protective actions for site workers and emergency teams.
4. Improve the ability to accomplish effective and timely accountability for personnel and to support prompt and effective search and rescue and medical treatment, including revising DOE Order 151.1 and implementing procedures to place a specific time limit (e.g., 30-45 minutes) for achieving personnel accountability.
5. Strengthen the ability of offsite hospitals to treat injured or exposed workers by providing information and training in advance on site chemical and radiological vulnerabilities, increasing training and drill participation by hospitals, sending exposure and contamination information with victims, and providing technical expert support to hospitals following accidents.
6. Use training, drills, and exercises to continue to strengthen command, control, and coordination among the emergency response organization, security, external support organizations, field monitoring teams, and reentry teams, with a particular focus on identifying emergency planning zones, plume boundaries, and other emergency radiological and chemical hazards that could impact workers.
7. Establish a coordinated system of facility-specific drills that involve other site organizations (e.g., medical and field monitoring) to establish and maintain response proficiency. A few sites, such as SRS, are already performing such coordinated drills.

Benchmarking

Several specific examples of effective practices enhanced safety of workers, including both victims and emergency responders, including the following:

- Hanford, as demonstrated in the 1998 annual emergency exercise, has made significant improvements in worker safety during emergencies. The rescue, transport, and offsite medical treatment for injured victims were timely and effective, including coordination with the hospital on injuries, exposure, and treatment.
- LANL medical support is effectively integrated into sitewide emergency preparedness, planning, and response activities. Noteworthy practices include:

- The occupational medical program has established a solid working relationship with the emergency response organization and supports the EOC effectively during emergencies.
- Assessments were performed to plan for the mitigation of health effects resulting from identified emergency situations.
- Information related to site hazards has been assembled for the medical staff to reference during emergencies.
- Professional medical staff participate in emergency drills, annual exercise scenario development, and exercise evaluations.
- Medical staff develop and provide training for the emergency response organization and hospitals on search and rescue and treatment of containment injuries.

Several sites have established and maintain highly qualified and well equipped emergency response teams for response to radiological or chemical emergencies and the timely and effective rescue and initial treatment of victims:

- The LANL Hazardous Response (HazMat) Team is well trained, experienced, and capable of responding to radiological or chemical emergencies on or off site:
  - The decontamination trailer is equipped with showers, sinks, and liquid waste holding tanks, and is stocked with protective clothing and decontamination supplies.
  - Chemical and radiological response vans have computerized consequence assessment capabilities.
  - The facility-specific Emergency Response Team at TA-55 is well trained and capable of providing effective initial response to facility emergencies.
  - Medical and hazardous material first-responder training is provided.
  - Quarterly emergency drills and continuing training are performed.
- INEEL emergency response facilities, equipment, and initial response personnel provide excellent capabilities for emergency response:
  - The fire department is well-equipped and trained, including training and certification in incident command, hazardous material technician, advanced exterior fire fighting, advanced first aid, and confined space and high-angle rescue.
  - The nursing staff is available on a 24-hour basis to respond, with the fire department, to emergencies.
  - Emergency response vehicles for radiological and hazardous material events include fire-fighting gear, self-contained breathing apparatus, chemical protective units, radiation monitoring equipment, anti-contamination clothing, portable electric generator, and air sampling equipment.
  - A facility Incident Response Team supports and complements the fire department during fire-fighting and rescue efforts.

Generic Weakness #4: Assessments and Continuous Improvement

DOE and contractor management oversight, assessment processes, lessons-learned programs, corrective action processes, and followup efforts have not been effective in assuring adherence to requirements and expectations, identification and resolution of significant weaknesses, and continuous improvement.

Structured and critical performance evaluation and feedback mechanisms (including line management oversight, assessments by DOE line management, contractor self-assessments, lessons-learned processes, corrective actions, and followup) are essential for ensuring the sustained ability to respond to and mitigate emergencies. When these evaluation and feedback mechanisms are functioning effectively, sites are likely to demonstrate continuous improvement and establish and sustain emergency management programs that adequately protect the public, workers, and environment. However, performance evaluation and feedback mechanisms are a significant weakness at most of the sites evaluated. DOE and contractor line management oversight and

assessment processes have not been effective in ensuring compliance with applicable requirements and policies, self-identification of deficiencies, timely resolution of significant deficiencies, or continuous improvement in emergency management programs.

In many instances, DOE's line management oversight and assessment processes have not been effective in identifying weaknesses in DOE performance or in contractor emergency management programs. Most DOE program offices are not effectively monitoring emergency management programs and performance at the sites and facilities for which they are responsible. Among the program offices, DP is more active in monitoring site performance, but the weaknesses in emergency management programs at several DP sites indicate that their efforts have not been effective. DOE field management, in most cases, has also been deficient in the management oversight and structured assessment of contractor emergency management progress and performance.

Neither DOE Headquarters nor operations offices have established and effective processes for the review and approval of contractor submittals related to emergency management such as hazards assessments, EALs, programs, and implementation plans. These processes are essential to maintaining effective programs and performance and ensuring timely and appropriate reviews and approval of contractor submittals. Transition of roles and responsibilities between EM offices has contributed to this deficiency.

Assessment activities by other DOE Headquarters offices, including EH and NN, have not compensated, and cannot fully compensate, for the weaknesses in line management oversight and assessments. Consistent with its mission, NN has performed technical assistance and reviews of exercises. However, NN assistance visits and exercise reviews are conducted in cooperation with the operations office (see Section 4, under "Headquarters"); some sites have not been reviewed by NN for several years. Historically, EH has not focused on emergency management. Prior to this Oversight evaluation, the EH Office of Oversight performed a study of DOE Headquarters emergency management in 1995 and has recently included emergency management programs during safety management evaluations. The 1995 study identified aspects of DOE Headquarters programs and EOC operations that needed attention and response by line management. However, the 1995 study was not acted on, and the same issues are evident today.

In most cases, contractors did not have structured and effective assessment and exercise critique processes sufficient to ensure emergency responses capabilities and achieve continuous improvement. Even where assessment and critique processes were established, they were not effective in identifying and resolving significant programmatic weaknesses. Emergency exercise critiques were generally informal and not well documented, focused on minor detailed symptoms or deficiencies, and did not include a systematic and thorough analysis of the identified deficiencies. Some sites did not assign evaluators to specifically evaluate critical elements of emergency management, such as field monitoring, search and rescue and the safety of those involved, public information activities, and the medical support provided by offsite hospitals.

The site-specific and generic weaknesses identified during this Oversight evaluation had, for the most part, gone unresolved by the responsible contractors, including significant weaknesses in critical areas of emergency management (e.g., classification, hazards assessments). For example, significant weaknesses observed during the SNL exercise (e.g., timely treatment of injured workers) were similar to issues evident in the Hanford emergency response and specified in the Secretary's memoranda. These weaknesses were not self-identified by the site, the elements or objectives were not graded as failed, and the objectives were not retested. As a result, this critical objective will not be demonstrated at least until the next annual exercise.

The weaknesses in assessment and critique processes are exacerbated by a failure to employ emergency management performance measurements, expectations, and assessment criteria that meet or exceed applicable DOE and industry requirements, standards, and performance expectations. Several contractors conceded that their performance expectations for emergency management and response performance had been too low and that they did not have a good benchmark for performance. The low expectations contributed to declining performance capabilities, failure to recognize and correct weaknesses, a false sense of confidence, and an overly optimistic view of the effectiveness of emergency management programs. In this environment, few sites have achieved fully effective programs and continuous improvement in emergency response capabilities.

SRS was a notable exception to this generic weakness. In conjunction with SR, the SRS contractor had established an aggressive self-assessment program for emergency management that included specific and stringent performance criteria, structured program assessments, and evaluations of emergency drills and exercises. RFFO has also established effective processes for performing assessments of their contractors.

Even in those instances where DOE or contractor assessment programs self-identified weaknesses in emergency management programs, the corrective actions have generally not been timely or effective in improving performance. Self-identified weaknesses or issues sometimes go unresolved for extended periods because of low priority or little management followup. In some cases, self-identified weaknesses received little attention until also identified by an external organization.

Most sites that were evaluated did not demonstrate a willingness to assign a failing grade to elements or objectives of emergency response exercises. Similarly, sites seldom required an entire exercise or specific elements of an exercise to be repeated, even when the performance was clearly less than satisfactory according to external evaluators or the site's own evaluation. In some instances, the elements or objectives were graded as satisfactory based on planned corrective actions that had not been completed or retested. The reluctance to assign a failing grade to all or part of an exercise is partly attributable to low expectations and a reluctance to commit to the cost and effort of another exercise. The absence of a clear DOE policy on retesting and criteria for failure also contributes to an atmosphere where poor performance can be accepted by line management without a retest and without clear accountability for achieving satisfactory performance. These weaknesses undermine the purpose of annual emergency exercises, can allow significant performance deficiencies to remain in place for extended periods, and substantially detract from DOE's confidence that an actual emergency can be effectively managed.

Opportunities for Improvement

1. DOE Headquarters, operations offices, and contractors: Establish and implement structured management oversight, self-assessment processes, corrective actions, lessons learned, and followup for emergency management programs, including performance criteria that meet DOE and industry requirements and expectations.
2. DOE: Establish a policy or revise DOE Order 151.1 to address failure of elements of emergency exercises or entire exercises. The policy should identify critical elements that must be redemonstrated if failed and should include a requirement to conduct a new exercise if a number of critical elements are failed.
3. Perform more frequent DOE management oversight of emergency management programs and exercises to ensure that emergency response capabilities meet approved DOE and industry requirements and management expectations and achieve continuous improvement across the complex.
4. Establish and implement a more structured and effective emergency exercise evaluation and critique process that includes documentation of systemic weaknesses, identification and analysis of management and programmatic weaknesses, and assurance of timely and effective corrective actions.
5. Ensure that assessments and exercise evaluations and critiques include all essential performance elements, including field monitoring, accountability, worker protection, monitoring, medical treatment, public information, and offsite medical support services.
6. Ensure that operations offices are held accountable for achieving and sustaining effective emergency management programs.

Benchmarking

Two sites (SRS and RFETS) have established the basic elements of a strong self-assessment program in emergency management. Although additional enhancements could be made in specific areas such as corrective actions tracking, these programs are contributing effectively to the self-identification and resolution of weaknesses and to continuous improvement in emergency management.

- RFFO oversight of the RFETS emergency management program includes annual assessments and has led to programmatic and facility-level improvements:
  - Active participation by Facility Representatives
  - Identification of issues related to emergency procedures, use of and adherence to procedures, and ventilation system improvements
  - Identification of hazards not included in hazards assessment inventories
  - Established performance milestones for completion of hazards assessments and links to formal incentives.
- WSRC has established an aggressive self-assessment program for emergency management. Attributes include:
  - Detailed performance assessment criteria/ objectives are established to support accidents.
  - WSRC Facility Evaluation Boards perform rigorous reviews of facilities and site reviews to ensure readiness of emergency plans, procedures, personnel, facilities, and equipment.
  - WSRC Emergency Services Department personnel are assigned to facilities to continually ensure emergency preparedness and response capabilities and provide technical assistance.
  - WSRC critiques of exercises and drills are comprehensive and accurate, and they provide information essential to ensuring emergency readiness.
  - Corrective actions for emergency management assessments are tracked and monitored to completion.

Generic Weakness #5: Training and Competencies

Training, drills, and exercises have not been effective in ensuring the competence and proficiency of emergency response organization personnel.

Maintaining a high level of competence and proficiency among emergency response personnel at all levels is essential to effective emergency management and the ability to mitigate events and thus protect workers, the public, and the environment. The transition from normal operations to emergency operations is not easy: organizational relationships and communications suddenly change, individuals suddenly take on new and demanding roles and responsibilities, and the site must interface with and depend on external support organizations and the public to a much greater degree than during normal operations. During the response to the Hanford explosion, the significant organizational interface, coordination, and communication problems resulted in delays in medical treatment and workers traversing the chemical plume, exemplifying these organizational challenges.

The difficulty in transitioning from normal to emergency operations is exacerbated by the limited opportunities to gain proficiency. At most sites, classifiable emergencies that require activation of the emergency response organizations are infrequent, so drills and exercises are needed to attain and maintain proficiency. However, the annual emergency exercises provide only a limited opportunity to demonstrate competence and proficiency since they occur only once a year and typically only involve part of the site (e.g., one facility) and a small fraction of the large number of people who have emergency management responsibilities. Conducting an annual exercise normally does not allow all emergency response organization members to participate. At some sites, state personnel, local authorities, and external support organizations may elect not to participate in every exercise; in some cases, such organizations participate only once every three years. In addition, there is no specific requirement that the DOE Headquarters Executive Team and line program technical cadre participate in emergency exercises at all.

In light of the limited opportunities to participate in annual exercises, it is particularly important that DOE Headquarters, operations offices, and contractors establish effective training and drill programs. Every site has training and drill programs in place, some of which are performance-based and effective. However, the results of this Oversight evaluation indicate that training and drill programs at many sites are not achieving and maintaining competence and proficiency. Drills,

tabletop evaluations, and exercises reveal wide-ranging deficiencies in the competencies and proficiencies of emergency response organization members at all levels within DOE and the operating contractors. For example, in many cases, initial responders or emergency directors were not able to promptly, proficiently, and conservatively classify events, and personnel responsible for conducting consequence assessments were unable to correctly use exposure tables. There are some important aspects of emergency management where little or no training or drills are being conducted. For example, few sites address the response to transportation events in their training and drill programs, and the Headquarters Executive Team has not been trained on their emergency response responsibilities, which include support to the field and interface with other government organizations.

There are a number of factors that contribute to weaknesses in competence and proficiency in emergency management and response across the complex. The emergency management organization typically consists of a small number of professional staff that is supplemented by operational staff, who are often volunteers. Often, the personnel who voluntarily offer to serve in an emergency management role receive no extra compensation and must "find time" to complete training and qualification requirements that are not an inherent part of their job description. The turnover in the operational staff is often high (one site experienced a 33 percent turnover in one year), hindering efforts to ensure proficiency. In a time of decreasing resources and funding, emergency management training and retraining must compete in priority with mission and research activities. Some managers view the potential for a major emergency as very remote. Consequently, they are reluctant to spend resources or to release staff from normal duties to attend annual training, and often assign low priority to elements that are prerequisites to an effective training and drill program, such as hazards assessments, EAL procedures, and training needs analysis. The recordkeeping for the training and qualification of emergency response organization members is often informal, making it difficult to maintain qualifications and proficiency and ensure that only qualified DOE and contractor individuals are assigned during actual emergencies. Overall, the training and drill programs lack structure and are not sufficiently developed, and site management has not ensured that individuals and site organizational elements are accountable for training and drills and for ensuring the competence of staff in performing their assigned responsibilities.

Specific examples of weaknesses in competence and proficiency include:

- Many initial responders responsible for classification were not proficient in performing correct and conservative classification of emergencies when given credible scenarios.
- The command and control over initial responders was inadequate; in some cases, initial responders entered emergency planning zones and hazardous plumes without protective equipment.
- Personnel responsible for performing and using consequence assessments did not correctly use exposure tables and generate protective action recommendations.
- During exercises, some personnel did not demonstrate competence and proficiency in personnel accountability, search and rescue, and decontamination and medical treatment for exposed and injured workers.
- For some offsite emergency support organizations, such as hospitals, training programs were deficient and the responsible site organizations did not evaluate interface performance during exercises.
- Emergency response personnel were not trained to respond to transportation events and were not consistently competent to classify transportation events and identify appropriate protective actions.
- Many DOE operations office personnel were not trained on their emergency response and responsibilities (e.g., classification and coordination with external support organizations and the public), nor had they demonstrated competence in these areas through drills and exercises.
- Personnel responsible for public and media information during emergencies did not perform effectively in some cases and, at some sites, are not required to receive training or annual retraining.
- Emergency response personnel were not competent and proficient in using newly developed procedures, EALs, and consequence assessment tables; in some cases, the sites had no requirements to ensure that personnel were

trained prior to implementing new procedures or tools.

- Hazards assessments, EALs, and procedures are not developed or maintained current to reflect changing hazards and conditions; as a result, training and drills do not reflect current conditions and are often based on outdated or draft documents.
- Some emergency response organization members, including senior DOE operations office management, are not attending required annual retraining or participating in the annual emergency exercises.
- The number of drills, tabletop exercises, and casualty drills is not sufficient to maintain competence and proficiency within all levels of emergency response organizations.
- At some sites, the casualty drills, which are essential to maintaining the initial response capability to mitigate events, are not effectively integrated into the site emergency management program.

Opportunities for Improvement

1. Ensure adequate initial training and retraining of both DOE and contractor emergency response organization members through increased priority, accountability, and management support and improved recordkeeping. Ensure that the training, drill, and exercise programs are designed to accommodate the size of the emergency response organization so that all members have an opportunity to participate and to ensure that all members maintain their competence.
2. Increase the use of drills, tabletop performance tests, and exercises to achieve and maintain a high level of emergency response organization competence. Include a specific requirement for retraining and demonstration of competence after poor performance in events, drills, or exercises.
3. Establish management systems that ensure that all applicable emergency response organization members are trained prior to implementing significant changes in exposure tables, consequences assessment tables, risks and hazards assessments, EAL procedures, emergency response procedures, or systems and equipment essential to emergency response.
4. Provide and support the level of training and retraining necessary to maintain proficiency and competence in the DOE Headquarters Executive Team, including participation in at least one exercise a year.
5. Ensure evaluation of interfaces during exercises for external support organizations, including hospitals, fire departments, police departments, and state field monitoring teams.
6. Strengthen the competence and proficiency of personnel providing public and media information through training, retraining, increased participation in drills and exercises, and improved coordination between site and Headquarters public affairs staff.
7. Provide incentives and/or rewards and sufficient training time to personnel who volunteer in supporting emergency management to promote participation and reduce turnover.
8. Provide field personnel with a general technical base of training in emergency management programs.

Benchmarking

Several sites display positive specific elements of emergency management training, drill, and exercise programs. SRS had the most complete and overall effective program. The SRS facility reviewed (the Defense Waste Processing Facility) has a training, drill, and exercise program that demonstrates SRS's commitment to maintain a highly competent and proficient emergency response organization. Positive attributes of this program, which were determined to be noteworthy practices, include:

- Facility-level team training is provided to shift managers, functional group leaders, and control room staff.
- Facility-level training is divided into four phases: activation, mitigation, stabilization, and recovery. An integrated drill is conducted that tests all four phases.
- Local exercises are performed.

- Operators participate in additional emergency response training during classroom shift training.
- Facility-level training and casualty drills are effectively integrated into a comprehensive sitewide program and into full-participation exercises.
- Emergency management capabilities and performance are included in annual performance appraisals to encourage continued improvement of individual skills.

Generic Weakness #6: Interfaces and Coordination with Stakeholders

The interfaces and coordination with external organizations and stakeholders are not consistently effective in ensuring a fully integrated response to an emergency in such areas as notifications, support services, field monitoring, protective action, and public information.

Effective interface and coordination with external organizations and stakeholders is a vital element of an emergency management program. External organizations, such as hospitals and fire departments, are often relied on to mitigate the hazards resulting from significant events. Timely initial event recognition, classification, and notification to external entities are essential to the mobilization of response resources and the planning and timely implementation of necessary protective actions, such as sheltering or evacuation. During the response to the Hanford chemical explosion, the site's offsite emergency management notifications to DOE Headquarters and state and local governments, which are required to be completed within 15 minutes, were not made for more than one hour.

The Secretary's August 27, 1997, memorandum addressed recent failures to accomplish timely notification of events and attributed their failure to "confusion with respect to Department notification requirements; attempts to gather detailed information before making initial notification; inadequate event classification procedures; and inadequate training of individuals responsible for classification and notification." The Secretary also stated: "I want to reinforce to all DOE senior management the importance of timely event recognition and notification. They are vital, both for communication and coordination during emergencies and for the Department's credibility and proper management in non-emergencies that require top management attention. Failure to notify all appropriate DOE and non-DOE officials will not be tolerated. Even when in doubt as to the applicability of standing guidance related to a specific event, notify state, local, and tribal officials and the Headquarters Operations Center."

To effectively coordinate preparation for and response to emergencies, DOE sites must establish and maintain agreements or MOUs with various external organizations, such as states, local governments, hospitals, tribal nations, and police and fire departments. These agreements are needed to effectively coordinate communications and flow of information, protective actions for the affected public, and protection of the environment. Pre-arranged and current agreements are also essential for maintaining effective external support or mutual aid, including hospitals and emergency medical treatment, fire fighting, police support, and coordinated radiological and chemical field monitoring. However, many memoranda of agreement and MOUs are not current or do not adequately address important elements.

Timely and accurate provision of emergency information to the public and media is also extremely important during the response to emergencies. There are still weaknesses at many sites in providing timely and accurate emergency-related information to the public, as demonstrated by recent actual emergencies, emergency exercises, and drills. The failure to provide timely and accurate information to the public and stakeholders contributes to rumors and even panic, can impede timely and effective protective actions, and undermines the Department's credibility.

Specific examples of weaknesses in external interfaces and coordination include:

- A failure to establish effective processes to establish and maintain current MOUs and memoranda of agreement with external organizations.
- Inadequate coordination with offsite emergency medical services and hospitals, including:
  - Outdated MOUs
  - Inadequate training and planning

- Failure to communicate potential site radiological and chemical hazards to hospitals in advance of accidents
- Inadequate site support to hospitals during emergencies, including radiological technicians and equipment
- Failure to respond to hospital requests for additional information on hazards and exposures during emergencies
- Failure to send essential dose or exposure data to hospitals with victims
- Inadequate hospital participation in emergency drills and exercises
- Failure to dispatch controllers or evaluators to hospitals during exercises to evaluate and improve emergency medical treatment.

- At SNL, significant command and control coordination problems were evident between SNL and the Kirtland Air Force Base during an emergency exercise due to unclear roles, responsibilities, and authorities and the absence of a current and well-understood MOU.
- At NTS, there were considerable coordination problems between the new management and operating contractor, which is responsible for the emergency management program, and the two national laboratories responsible for test activities.
- Numerous deficiencies were observed with the effectiveness of Joint Information Centers (JICs):
  - At RFETS, the JIC is in a facility owned and operated by the state, and more than two-thirds of the positions are filled by state representatives, including key positions such as JIC Manger, Media and Public Inquiry Supervisor, and the Administrative Support Supervisor. While promoting integration, this arrangement has significant drawbacks, including poor definition of RFFO roles, responsibilities, and authority in the JIC; inability to use the JIC facility for drills and exercises because of other state activities; and inability of many of the state JIC representatives to participate in emergency exercises and drills to maintain the proficiency and competence.
  - The JIC staff at a number of sites do not routinely participate in drills and exercises to maintain their competence and proficiency. In some cases, certain members of the JIC staff have not participated in an emergency exercise even once a year.
  - In some cases, technical representatives were not assigned to JICs to assist in the development and ensure technical accuracy of press releases, and to assist in responding to technical questions at press briefings.
- Unnecessary and significant delays frequently occurred in the transmission of accurate emergency information to the public and media through press releases and briefings:
  - Failures of essential equipment, including printers, facsimile machines, and computer systems, caused significant delays in the release of emergency information. At Hanford, during the June 1998 exercise, equipment failures contributed to the delay in issuance of DOE's critical event information for over an hour. The state issued its press release well before the site.
  - Multiple layers of DOE and contractor reviews, approval, and consensus on draft press releases caused significant delays in issuing press releases and timely information.
  - During the ORNL exercise, the issuance of a field press release that had been approved at the field level was delayed unnecessarily when DOE Headquarters inserted itself into the review and approval process.
- Some state emergency preparedness organizations indicate a continuing reluctance by some sites and contractors to make notifications of events and operational emergencies until they have fully analyzed the event and "have all the answers."

Opportunities for Improvement

1. Reevaluate the design, capacity, location, and communications capabilities of JICs to ensure the ability to obtain timely and accurate information, accommodate the media, conduct effective and efficient press briefings, and ensure accessibility for emergency drills and exercises.

2. Improve the competence and proficiency of JIC managers and staff through increased training, retraining, and more frequent participation in drills and exercises that include the JIC.
3. Assign a trained technical representative to the JIC to assist in ensuring the technical accuracy of press releases and in responding to questions in press briefings. Provide for a standby cadre of trained technical specialists from various disciplines to be on call as needed to support provision of information to the media and the public.
4. Establish, implement, and practice more effective and timely processes for the preparation, review, and approval of press releases in the field and at DOE Headquarters to ensure timely and accurate dissemination of emergency information.
5. Establish effective processes for ensuring interfaces and coordination with external organizations, establishing and maintaining current agreements or MOUs, holding periodic meetings, promoting more external participation in emergency drills and exercises, and clarifying roles, responsibilities, and authorities.
6. Strengthen offsite emergency medical support by establishing MOUs with hospitals, providing radiological technician support to hospitals during emergencies, increasing training and participation in drills and exercises by hospitals, providing information on site chemical and radiological hazards to hospitals in advance, and sending detailed dose or exposure information with emergency victims as they are transported to medical facilities.

Benchmarking

While a number of sites demonstrated improvement in interfaces and coordination with external organizations and stakeholders, several sites or programs demonstrated particular strengths in this area:

- RFFO and RFETS have established a strong working relationship with the State of Colorado and local stakeholders on emergency management issues:
  - An effective partnership with the State of Colorado and local communities has been established to address emergency planning and preparedness issues.
  - The site sponsors an active Emergency Planning Zone Oversight Committee that includes technical experts from RFFO, site contractors, other Federal agencies, and the state. This committee independently evaluated the technical basis for hazards assessment and the RFETS consequence assessment modeling program.
  - The RFETS emergency management program manages presentations to the Citizens Advisory Board.
  - RFETS personnel participate in the Joint Emergency Planning Team led by the State of Colorado Department of Public Health and Environment.
- TSD has implemented an effective program for ensuring that MOUs and memoranda of agreement between Federal, state, tribal, and local government agencies and mutual-aid organizations are maintained current and effective.
- The LLNL emergency management system is well integrated with the State of California standardized Emergency Management System, which:
  - Facilitates information flow between operational elements
  - Facilitates and improves coordination among responding agencies
  - Includes three operational areas: law enforcement, fire and rescue, and emergency preparedness
  - Conducts joint hazards materials reference, drills, and training
  - Has an MOU defining mutual assistance and emergency reference interfaces.
- ORNL safeguards and security protocols for maintaining current MOUs with Federal, state, and local law enforcement agencies are effective and could be used as a model for maintaining offsite agreements. They include:
  - Annual meetings with law enforcement agencies
  - Annual integrated security exercise
  - Annual validation and update of MOUs.

Generic Weakness #7: DOE Emergency Management Order

Some provisions of DOE's emergency management order (DOE Order 151.1) are unclear or require modification. DOE and contractor leadership, management followup, and accountability have not been sufficient to ensure that the order is effectively implemented, contributing to continuing weaknesses in emergency management and response and varying levels of performance across the DOE complex.

Clear and comprehensive DOE policy is essential to achieving and sustaining acceptable emergency management programs across DOE's widely varying missions, facilities, life cycles, and hazards. Until the mid-1980s, DOE had few formal requirements for managing emergencies. Before then, each site had its own methods of coping with emergencies, most of which were ad hoc approaches that relied extensively on experienced individuals to make timely decisions. DOE Order 5500.1, Emergency Management System, which was issued in 1987, established a formal DOE-wide set of requirements for DOE emergency management systems. Among other things, this DOE order, and subsequent revisions in 1991 and 1995, established requirements for sites to have emergency management organizations, to coordinate with stakeholders (e.g., state governments), and to have programs for drills and exercises. The current order, DOE Order 151.1, Comprehensive Emergency Management System, was issued in 1995. One of the goals of the revision was to further clarify roles and responsibilities, particularly at Headquarters. The order specifically calls for a partnership among NN, program offices, and operations offices in providing direction to emergency management programs and ensuring that they are effectively implemented.

While DOE Order 151.1 contains significant improvements over previous versions in its approach to a comprehensive emergency management system, it contains fewer specific requirements and thus is more subject to interpretation, which has contributed to weak implementation at some sites (e.g., time lines for classification). In addition, there are a number of generic concerns with the provisions of the order, and with interpretation and implementation of those provisions.

For example, DOE Order 151.1 requirements do not ensure timely event classification. As a result, undesirable delays continue to occur in the subsequent activities needed to protect personnel, mitigate events, and notify stakeholders. Because the order no longer places a time limit on personnel accountability, there can be delays in the search, rescue, and medical treatment for emergency victims. Offsite transportation accidents are addressed indirectly by the order, under a provision that such an event should be treated as an operational emergency not requiring further classification. Onsite transportation activities are not addressed by the order or its supporting guidance. Revisions to the order that address transportation are pending.

Acceptance and implementation of DOE Order 151.1 have varied significantly across the DOE complex. Some sites and contractors have taken aggressive action to accomplish timely implementation, while others have made very little progress. Some sites and contractors have not effectively implemented specific order requirements, such as the requirement to develop comprehensive hazards assessments to support emergency management EALs and protective actions, and will not meet established schedules and milestones.

In December 1997, in response to the Hanford chemical explosion, the Deputy Secretary of Energy emphasized specific schedules and directives related to DOE Order 151.1: "All sites/facilities must be in full compliance with DOE Order 151.1, Comprehensive Emergency Management System, by September 30, 1999. By March 31, 1998, those sites/facilities that have excluded or plan to exclude any requirements of the Order for their contracts must fully document the exclusions and replacement provisions and provide this information to the Director, Office of Emergency Management, who will then process the request to comply with DOE 151.1."

Leadership, participation, and followup by DOE Headquarters and operations offices, including the partnership referred to in DOE Order 151.1, have not been adequate to ensure consistent, effective, and timely implementation of the emergency management order and DOE policy. There has been inadequate followup to the Secretarial directives to ensure that contractor responses were adequate and that programs were effectively implemented. In some cases, accountability for emergency management programs has not been clearly assigned to individuals or adequately formalized through

effective contractual language, performance criteria, rewards, and sanctions.

Examples of this generic weakness in emergency management policy and implementation include:

- Omissions and ambiguity in DOE Order 151.1 requirements are contributing to weaknesses and varying levels of performance in emergency management and response:
  - There is no specific time limit on initial event classification, other than "be prompt."
  - The time limit of 15 minutes for emergency notifications does not begin until an event is classified.
  - There is no longer a time limit on achieving personnel accountability in an emergency.
  - There is no requirement in DOE Order 151.1 or the startup/restart order to conduct a successful full-participation exercise before starting up new hazardous facilities.
  - The scope of hazards assessments, as specified in the DOE order, does not include accidents that are beyond the design basis (e.g., earthquakes, malevolent acts).
  - Events and accidents related to the onsite transportation of hazardous materials are not clearly addressed in DOE Order 151.1.
  - Orders requiring implementation of an emergency management program (e.g., DOE Order 5610.14, Transportation Safeguards System Program Operations) for events and accidents related to transportation of nuclear weapons and special nuclear materials are absent from DOE Order 151.1.
- The field responses to the Secretary's directives to improve classification, hazards assessment, training, and protection and medical treatment of workers, and external interfaces were, in some cases, not representative of actual performance and continuing weaknesses. The management followup and quality assurance applied to these responses by DOE Headquarters, DOE field management, and contractor management were not proactive or effective.
- The "partnership" between Headquarters cognizant secretarial offices, operations office managers, the Office of Emergency Management, the Office of Field Management, and EH has not, in many instances, been effective in ensuring emergency management performance and contractual requirements in accordance with DOE Order 151.1. Deficiencies in this partnership are reflected in continuing conflicts between DP and NN on emergency management, a lack of program office participation in emergency management, inadequate response to emergency management issues identified by NN and EH, and weaknesses in performance assessment and oversight by all partnership members.
- In some cases, contractual language and performance metrics related to emergency management and preparedness are still not sufficient to achieve accountability for performance and the implementation of DOE Order 151.1 and DOE policy. An example occurred in March 1997, prior to the Hanford chemical explosion, when RL management issued a letter directing Fluor Daniel to correct several deficiencies related to emergency management and response in a number of areas, including radiation control technicians' support, facility preparedness, drill programs for radiological response, and capabilities to effectively conduct radiological and chemical plume tracking and monitoring. Fluor Daniel's initial response to this DOE direction was that it "exceeded the Contracting Officer Representative authority" and that "the direction does not fall within the scope of our current prime contract." Many sites, including Hanford, do not plan to be in compliance with DOE Order 151.1 until September 1999.
- Leadership and the implementation of DOE policy have not been effective in resolving fundamental weaknesses identified in emergency management and achieving continuous improvement:
- A 1973 Government Accounting Office (GAO) report identified weaknesses in DOE emergency management that still exist in 1998:

- Radiological emergency preparedness does not receive adequate priority, including emergency planning and public information.
- DOE's emergency management program lacked the necessary coordinated, uniform approach, and emergency performance responsibilities were fragmented, not clearly defined, and not always carried out.
- The role of DOE Headquarters was not clearly identified in field/area office emergency plans.

- A 1995 EH report on Headquarters emergency management identified redundancies, inefficiencies, and a lack of effectiveness within the different program offices' emergency management programs, and recommended a single Headquarters emergency management program with a central point of leadership.
- The followup to the 1997 Hanford chemical explosion identified numerous emergency management deficiencies in control over such elements as classification, notifications, hazards assessments, protection and medical treatment of workers, and competence of emergency response organization members. Despite the lessons learned and the Secretarial directives, many of these same fundamental weaknesses still exist today at other sites and facilities across the complex.
- In one case, the DOE field office granted five exemptions to the contractor in the elements of DOE Order 151.1 in such areas as frequency of DOE review of hazards assessments and declaration of operational emergencies. These exceptions were approved and incorporated into the contract without review or approval by Headquarters programs offices or the Office of Emergency Management. Exemptions to DOE Order 151.1 must be properly controlled to assure emergency management capabilities complex-wide.

Opportunities for Improvement

1. Revise DOE Order 151.1 to contain more explicit requirements for essential actions during an emergency and that are reflective of DOE policy and related industry practices:
   - Place a reasonable but specific time limit on the initial classification of an emergency that requires classification (e.g., 15 minutes).
   - Initiate the 15-minute initial emergency notification requirement when it is recognized that an event has occurred that may require classification, or that an operational emergency exists, rather than linking it to the time of classification.
   - Reestablish the time limit (e.g., 30 minutes, but no longer than 45 minutes) for achieving personnel accountability in an emergency.
   - Require accidents beyond the design basis to be included in hazards assessments.
   - Require all transportation activities on and off site to be included in the site's comprehensive emergency management system.
2. Strengthen implementation of the DOE Order 151.1 "partnership" between program offices, operations offices, the Office of Field Management, the Office of Emergency Management, and EH to achieve a more consistent approach to emergency management, including benchmarking, sharing of lessons learned, and more critical evaluation of performance and emergency exercises.
3. Strengthen accountability for emergency management programs through stronger and specific contract language and quantitative performance measures, a requirement to repeat emergency exercises or exercise elements that failed, and inclusion of emergency management responsibility and performance in the annual appraisals of DOE managers and staff.
4. Strengthen independent oversight of emergency management and preparedness, including the evaluation of programs and emergency exercises with DOE Headquarters, operations offices, operating contractors, subcontractors, and interfaces with stakeholders and support organizations.

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APPENDIX B
Team Composition

The team membership, composition, and responsibilities are as follows:

Deputy Assistant Secretary for Oversight
Glenn Podonsky

Associate Deputy Assistant Secretary for Oversight

Neal Goldenberg (Technical)
David Stadler (Operations)

Office of ES&H Evaluations

Michael Kilpatrick, Director

Team Leaders

Charles Lewis, Team Leader/Project Manager
Tom Staker, Team Leader
Brad Peterson, Team Leader
Richard Lagdon, Team Leader

Evaluation Team Members

Pat Worthington
Kathy McCarty
Marie Dunkle
James Davis
Ed Stafford
Jerry Bennett
Mark Good
Marvin Mielke
Dave Allard
Fred Leverenz
Doug Trout
Jim Lockridge
Dave Berkey
Bob Compton
Dave Schultz
Jerry Martin
Bill Miller
Jeanie Polehn
Brad Davy
Skip Singer

Steering Committee

David Stadler, Chairman
Ray Hardwick
Dean Hickman
Bob Nelson
Sonja Haber

Administrative Support

Tom Davis
Mary Anne Sirk
Shirley Cunningham
Marcia Taylor
Kathy Moore
Yolanda Parker
Leisa Weidner
Tracey Whipp
Perry Webster
Sharon Wilder

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ABBREVIATIONS USED IN THIS REPORT

AL	DOE Albuquerque Operations Office
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DP	DOE Office of Defense Programs
EAL	Emergency Action Level
EH	DOE Office of Environment, Safety and Health
EH-1	Assistant Secretary for Environment, Safety and Health
EM	DOE Office of Environmental Management
EOC	Emergency Operations Center
ER	DOE Office of Energy Research
ES&H	Environment, Safety, and Health
ID	DOE Idaho Operations Office
INEEL	Idaho National Engineering and Environmental Laboratory
KAO	Kirtland Area Office
LAAO	Los Alamos Area Office
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
LMITCO	Lockheed Martin Idaho Technologies Company
MOU	Memorandum of Understanding
NE	DOE Office of Nuclear Energy, Science and Technology
NN	DOE Office of Nonproliferation and National Security
NN-60	DOE Office of Emergency Management
NTS	Nevada Test Site
NV	DOE Nevada Operations Office
OAK	DOE Oakland Operations Office
OR	DOE Oak Ridge Operations Office
ORNL	Oak Ridge National Laboratory
PRF	Plutonium Reclamation Facility (Hanford Site)
RFETS	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RL	DOE Richland Operations Office
SAR	Safety Analysis Report
SNL	Sandia National Laboratories/New Mexico
SR	DOE Savannah River Operations Office
SRS	Savannah River Site
TSD	AL Transportation Safeguards Division
WSRC	Westinghouse Savannah River Company

Office of Oversight Terminology

Noteworthy Practice: An exceptional or innovative approach that could be useful for benchmarking by other DOE sites and facilities.

Positive Attribute: A management system, process, or work practice that demonstrates a fully effective approach or relative improvement.

Weakness: A systemic or significant deficiency in a management system, process, or activity that has an actual or potential negative impact and warrants management attention.

Opportunity For Improvement: Non-prescriptive summary level enhancements or innovative approaches to the resolution of identified weaknesses provided for the benefit of and consideration by line management.